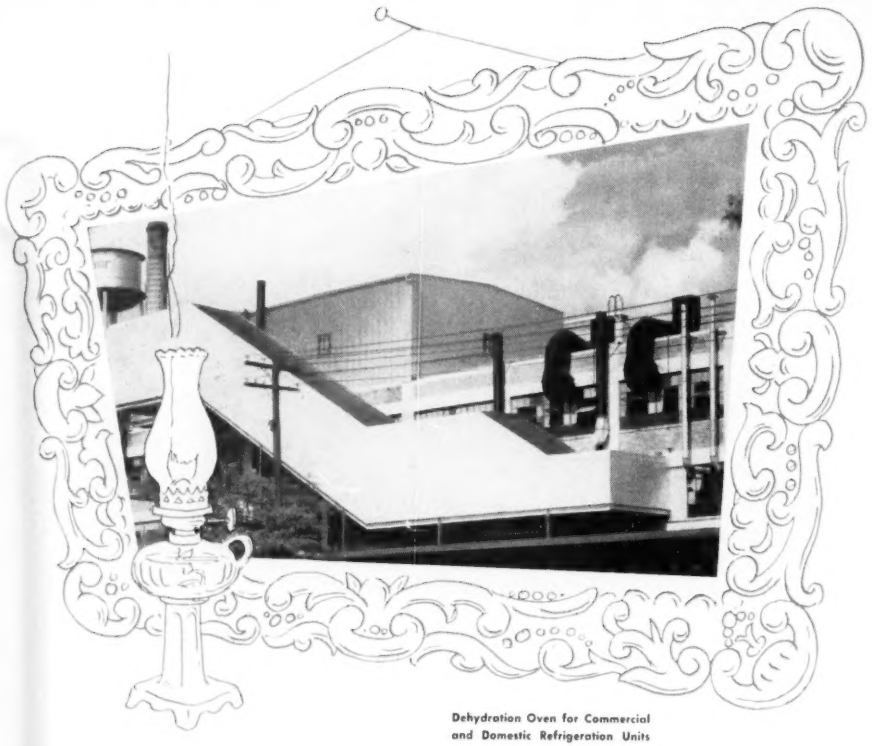
Products Finishing

CLEANING
PLATING
POLISHING
FINISHING

AUGUST 1951



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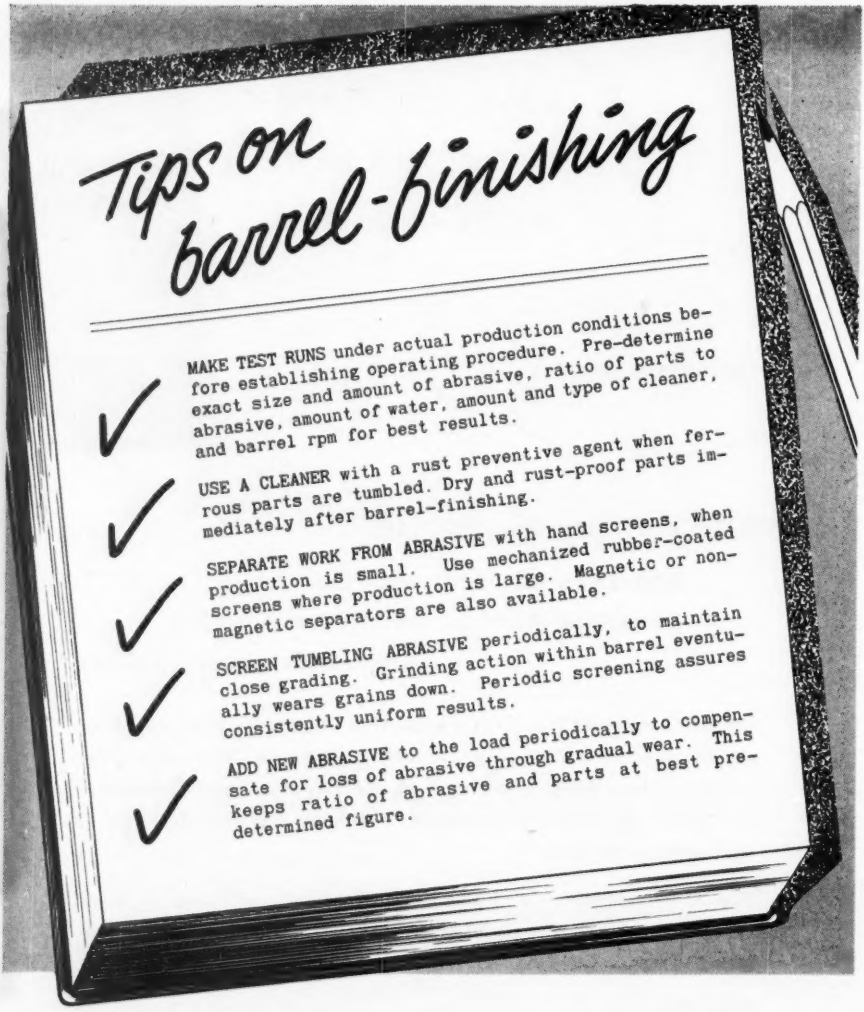
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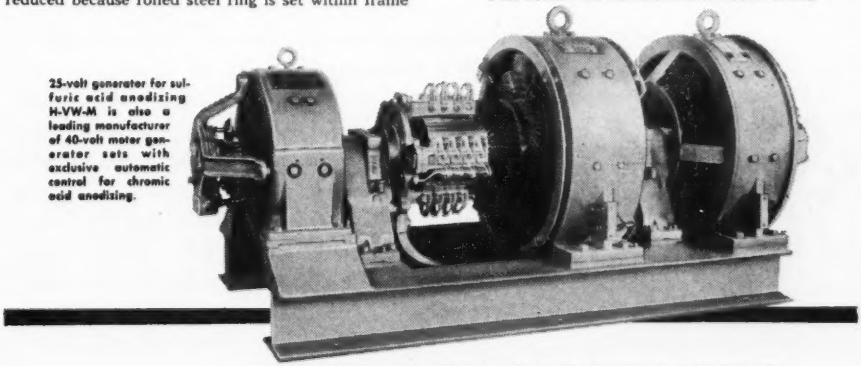

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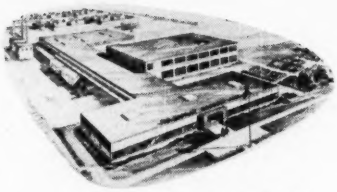

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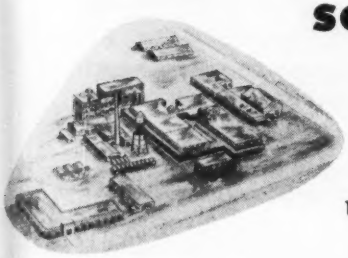

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EZRA A. BLOUNT, *Editor*
(On leave of absence
U. S. Air Force)

Products finishing

AUGUST 1951
VOLUME 15 • NUMBER 11

CONTENTS

Versatility Characterizes Paint Application Methods 11
Editorial

Plating Rotogravure Printing Rolls 12
By Ezra A. Blount

Comparative Testing of Metal Coatings 20
By Gilbert C. Close

Aerocoach Bus Finishing Aided by Natural Gas 26
By Arthur Q. Smith

Permanent Gloss Standards Aid Finish Inspection 32

Check Solvent Safety Before Winter Comes .. 38

Spotlighting Finishing Progress
By Dr. Allen G. Gray

—Recent Developments in Plating Methods and Equipment 50
—Factors Affecting Antifouling Paints 76
—Monel Pickling Equipment Gives Long Service Life 78
—Resistance and Capacitance Measurements Are Useful in Determining the Corrosion Resistance of Painted Steel 82
—Smoothing Metal Surfaces by Electropolishing Avoids Cold Working Effects 90

Practical Applications of Modern Products
—Aluminum Architectural Products Anodized for Corrosion Resistance in Florida Plant .. 94

News of the Industry 98
Finishes That Aid in Appearance and Utility ..108
New Equipment, Materials, Processes 110
The Finishing Touch 126
Opportunity Section 127
Index to Advertisements 128

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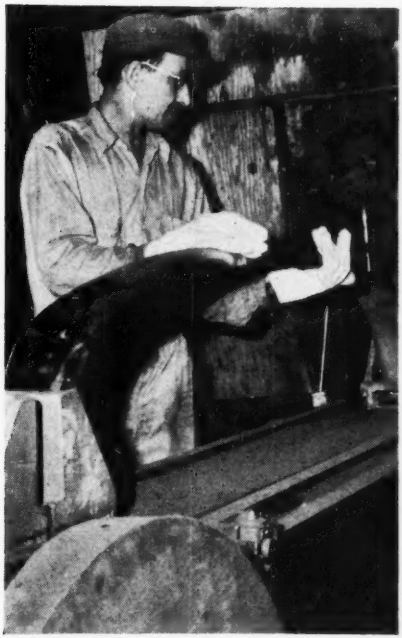

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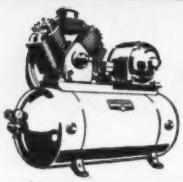

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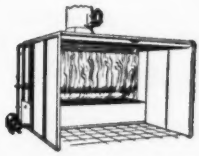

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Pf editorial

Vol. 15, No. 11

AUGUST, 1951

Versatility Characterizes Paint Application Methods

Many of the users of paint, varnish, lacquer, or enamel coatings for metal products do not realize the fact that this group of finishing materials may be applied in at least nine different ways, including the familiar brushing method. Most finishers are aware of the fact that organic coatings may be applied by dipping or spraying, since those methods have become firmly established in industry.

More specialized in their industrial uses, and therefore not so well known, are roller-coating and tumbling methods of applying paint finishes.

In the field of sprayed finishes, development work has been accomplished to improve spraying efficiency, reduce overspray, and decrease finish and application cost. Lacquer or enamel may be sprayed in an electrostatic field (thus reducing overspray), may be sprayed hot (thus reducing solvent cost), or may be sprayed with steam instead of air (thus reducing application cost). A recent development is a rotary open-end drum-type machine which creates a paint fog. Strip stock may be coated rapidly by passing it through the fog. Excess paint drops back into the drum so that it is not lost.

The significant point about all these application methods is not the fact that there are so many, but that ALL are useful. The technical service representative of your paint finish supplier can advise you which method fits your need.

Once you have decided which finish application method (or methods) to use, your finish supplier can formulate a finish (or finishes) to your process and service specifications.

Ezra A. Blount

—EDITOR

Plating Rotogravure Printing Rolls

By EZRA A. BLOUNT
Editor

PF FEATURE

The various magazine sections or "Sunday supplements" to our daily newspapers, printed usually in four colors, have become an accepted part of our everyday living. Lately, the use of color in daily newspaper advertisements has been widely adopted. It is predicted that multicolor advertisements in newspapers will find increasing use in the future, until the daily newspaper becomes as colorful as the special Sunday sections now appear.

These developments and trends are of great interest to such organizations as Southern Gravure Service, Inc., experts in the preparation of the printing rolls required for multicolor, continuous printing. In the well equipped, two-story plant of this company, printing rolls from 4 inches in diameter and 12 inches in length, to 18½ inches in diameter and 80 inches in length are processed for many leading multicolor printing firms located in various cities of the United States, including New York and San Francisco.

Accuracy of roll size and color design location is of primary importance, because, as a continuous strip of paper feeds through a large press at high

Printing rolls used in large, multiple color, continuous printing presses are copper plated, cut to size accurately and polished, etched with the designs which will form the several colors, and chromium plated with an appreciable thickness of hard chromium to ensure long wear and sharp, clear impressions on the printed page.

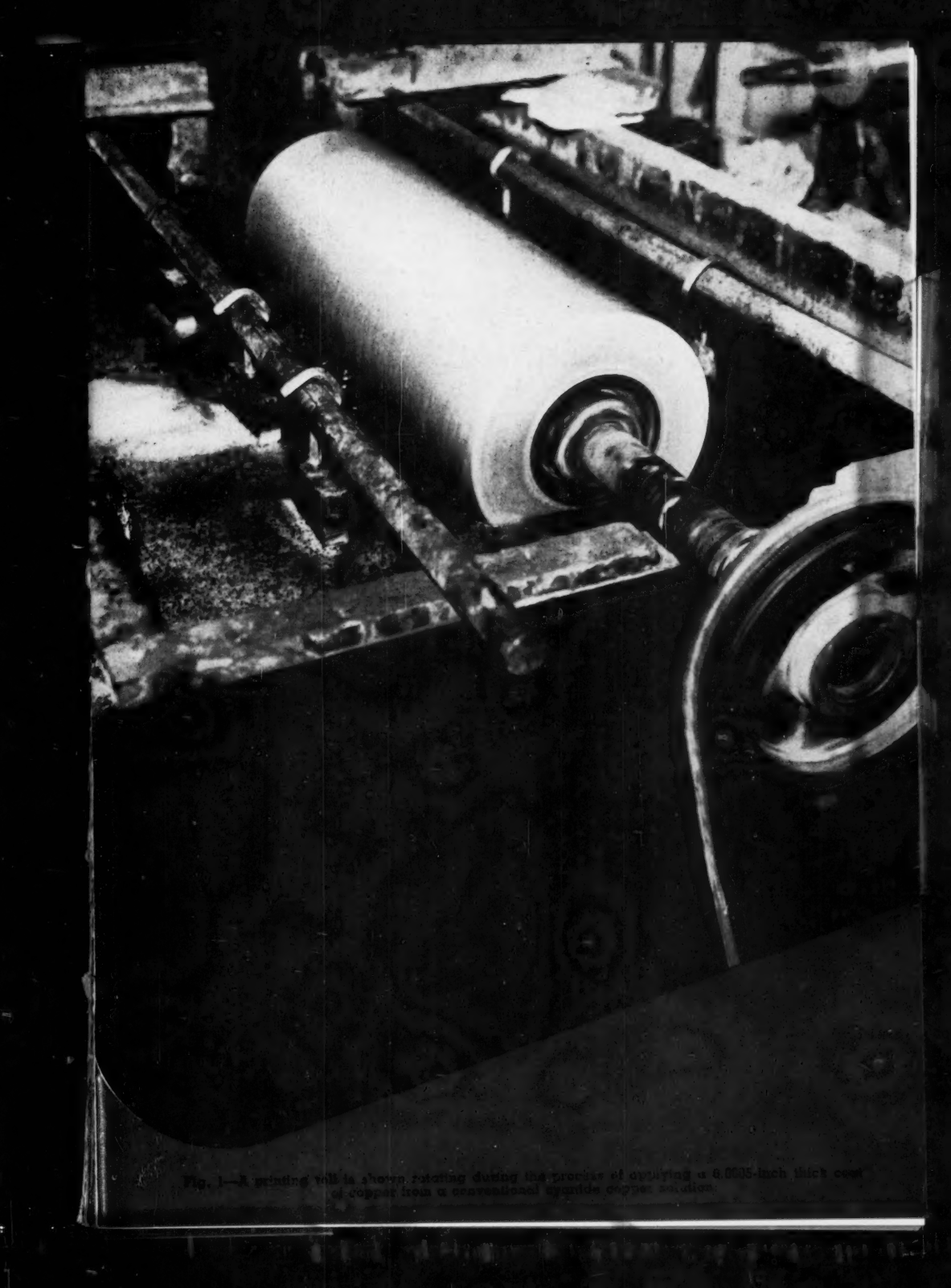


Fig. 1—A printing roll is shown rotating during the process of applying a 0.0035-inch thick coat of copper from a conventional cyanide copper solution.

speed, each color design must print at exactly the right place, or the entire printing job is unsatisfactory.

Cyanide Copper Plating

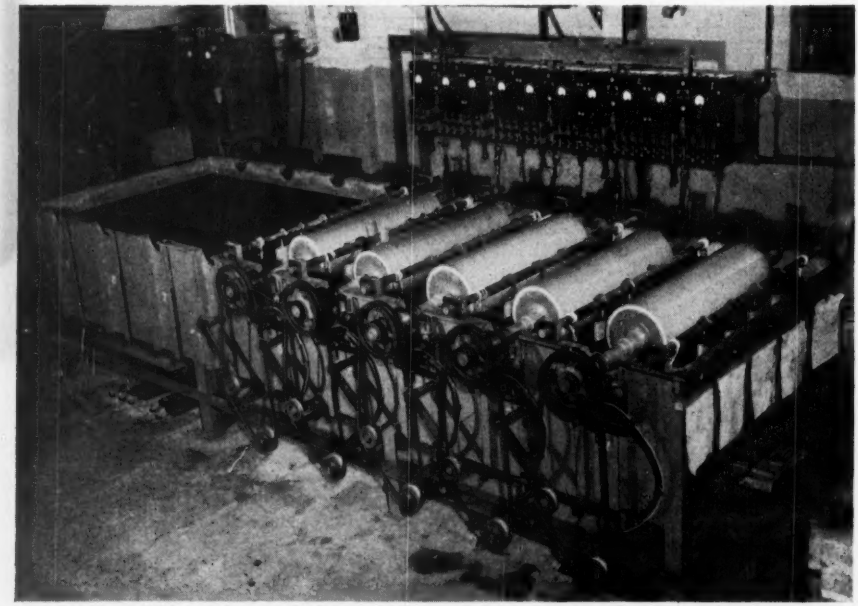
Rolls for rotogravure color printing are made of steel or fine grained cast iron (centrifugally cast). These rolls are delivered to Southern Gravure with a ground or fine tool finish, turned down 0.02 inch in diameter below final finished size. The rolls are processed through the copper plating operation by means of the following operations:

1. Clean by washing with VM&P naphtha.
2. Insulate roll ends around shaft with Koroseal tape so that plating extends around the ends of the rolls only as far as desired .
3. Hand pickle with muriatic acid, and rinse.
4. Scrub (hand brush) with a strong caustic soap of the whale oil type.
5. Thorough water rinse.
6. Copper plate for 45 minutes at 50 amp./sq. ft. in a conventional cyanide copper solution operated at 120 deg. Farenheit.

Hand brushing of the roll (as it rotates in the cyanide copper solution) for 30 seconds before the current is applied removes any possible surface contamination that may have occurred.

As can be noted in Fig. 1, the roll is rotated during the plating operation (at a speed of 300 surface feet per minute) by means of a pulley, attached to the roll shaft and motor-driven. Electrical contact is made with the roll shaft by a spring bronze leaf commutator arrangement, which can be seen more clearly in Fig. 2.

Fig. 2—A view of the nine-station acid copper plating tank used to deposit copper on printing rolls. In the background may be noted the rheostats and control switches used to regulate the current being delivered to the several sections of the acid copper tank.



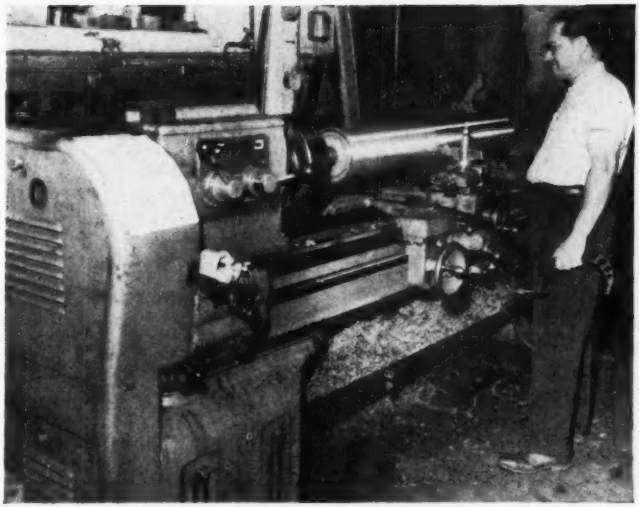


Fig. 3—A view of the turning operation performed on copper plated rolls in a Sebastian lathe.

Two steel tanks, of 120-gallon and 310-gallon capacities respectively, are used for cyanide copper plating solution. As Fig. 1 shows, rolls are plated only partially immersed in the plating solution. The amount of immersion varies with cylinder size, and may amount to from 10 to 40 per cent of the surface area of the roll.

Power is supplied to the copper tanks by several Hanson-Van Winkle-Munning and General Electric rectifiers, rated at 500 amperes and 6 volts.

The cyanide copper plating operation applies a coating of copper 0.0005 inch thick (0.001 inch increase in diameter) to the printing roll.

Acid Copper Plating

After a roll receives the preliminary copper plate in the cyanide copper tank, it is rinsed thoroughly and placed in one of the nine plating positions in the acid copper tank (see Fig. 2). Here again it is rotated at 300 s.f.m. in the plating solution and hand brushed for 30 to 40 seconds before the plating current is applied. After this precautionary cleaning operation to ensure a smooth plating surface—free from surface dirt—the current is applied and plating continues for about ten hours. During this period the roll diameter is increased 0.03 inch, or 0.01 inch over the finished size of the roll.

The acid copper solution contains:

Copper sulfate.....33 oz./gal.,

Sulfuric acid....10-11 fl. oz./gal.,

and is operated at 110 deg. F. Current density is adjusted so that approximately 0.003 inch of copper plate is added to the roll diameter each hour. This figure varies according to how far the particular printing roll may be lowered into the acid copper bath.

The acid copper plating tank (see Fig. 2) is made from steel and lead lined. It measures 14 feet long, 45 inches wide, and 21 inches deep, and holds 748 gallons of solution. In addition to the accessory equipment needed for rotating the rolls and carrying the current to the rolls, the plating tank is equipped with Plexiglas sheets. These sheets are suspended around the inside of the tank, to prevent any metal buildup on the tank sides.

Lead steam coils furnish heat for the acid copper tank. Following sound engineering practice, the lines are not hooked to the boiler return.

Sizing Copper Plated Rolls

Copper plated rolls are turned on a lathe (see Fig. 3) with the aid of a

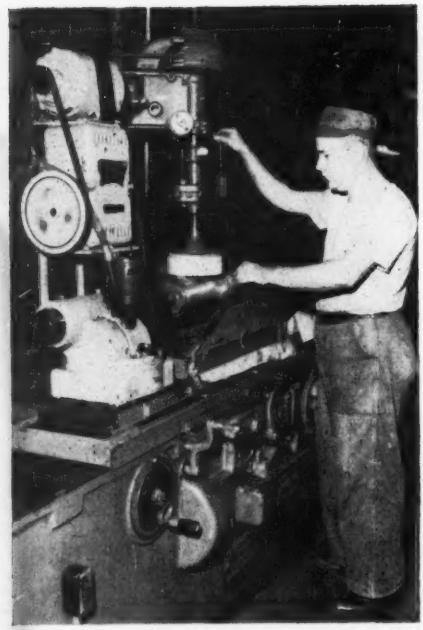


Fig. 4—The final grinding or wet honing operation on a copper plated roll is performed in this Cincinnati Roll Grinder fitted with a drill press to rotate the polishing head.

Carboloy-tipped cutting tool until the diameter of each roll measures 0.003 inch over finished size.

Each machined roll is next ground to size in a Cincinnati Roll Grinder fitted with a Delta drill press in which is mounted the grinding wheel (see Fig. 4). The roll is rotated during the operation and moved horizontally at the rate of 9 feet per minute. The grinding head is a Carborundum S400 Intaglio stone mounted in floating sponge rubber. This head rotates continually and reverses direction automatically with each pass. A spray of water cools the copper surface of the roll during grinding; actually the process is a wet honing operation.

After each roll is sized perfectly, it is polished with a rouge stone to a mirror finish.

Etching and Proofing

Each design to be etched into a printing roll is first printed as a photographic positive on carbon tissue which has been coated with a pigmented gelatin and sensitized with potassium dichromate. The image is next transferred to the wetted copper roll in much the same way as a decal is applied. Ends of the roll and joints in the gelatin film are "staged" or painted with asphaltum.

The design in the gelatin film is next "developed" or the "exposed" areas dissolved with warm water. The gelatin film protects the copper plated roll from the action of the etching solution except where the designs (previously photographed or exposed to light) have been dissolved away by the warm water. The roll, with its gelatin coating, is dried prior to etching.

The roll, mounted over an etching tank (as shown in Fig. 5), is next etched with a solution of ferric chloride to cut the various designs into the copper to the proper depth. Careful and thorough rinsing with water follows the etching operation.

After an etched roll has been rinsed, the asphaltum "staging" used on the roll prior to etching is removed with VM&P naphtha. The gelatin film, which served as a mask to confine the etching solution to just those areas to be etched, is removed with an acetic acid-salt solution.

Water rinsing and drying of the etched copper roll follow, after which the copper surface is brightened with metal polish. Critical inspection of the etched design, and hand tooling of the design where necessary, complete the work of creating an etched design on the copper plated roll.

The etched copper printing roll is next mounted in a proof press where it is "proofed" for mechanical accuracy and color separation of design, both very important to the finished roll.

Chromium Plating and Final Finishing

Copper plated printing rolls, after passing proof press inspection, are hand polished with Behr-Manning 2/0 emery polishing paper in preparation for chromium plating. Rolls are then cleaned preparatory to plating using the following process steps:

1. Rotate and hand polish with H-VW-M buffing compound and water.
2. Dry with Kimpok.
3. Rinse with warm water.
4. Scrub with powdered soapstone—warm water.
5. Remove bulk of water with "squeegee."
6. Dry with cotton.
7. Chromium plate direct over copper surface.

Chromium plating is performed in two tanks at Southern Gravure Service. One tank is 6 feet long, 3 feet wide, and 6 feet deep, designed to chromium plate rolls suspended vertically in the tank. Figure 6 shows a roll ready to be lowered into this tank for chromium plating.

The solution contains 33 oz./gal. chromic acid with the sulfate ratio held at 100 to 1. The solution is operated at 120 deg. F. and plating is carried out at 1½ amp./sq. inch.

The solution is heated with steam, conducted through lead coils, and the temperature is controlled by a Sarco LSI regulator. A 6-volt, 1500-ampere rectifier furnishes plating current. As can be noted in Fig. 6, conventional lead anodes are employed, and a ring or "thief" to remove excess current and prevent burning on the lower edge of the roll is employed.

Rolls to be used for printing labels or for various publications are chromium plated 0.0003 inch on each side. This thickness of deposit can be secured in 35 to 45 minutes. Rolls for printing cardboard, or for use where abrasive ink conditions are to be encountered, require a heavier chromium plate. Such rolls are plated to a thickness of 0.0006 inch of chromium.

In addition to the chromium plating tank described above, a larger tank (140 inches long, 38 inches wide, and 40 inches deep) is also in use. Large rolls are chromium plated in this tank, mounted horizontally as shown in Fig. 7, and rotated continually by a motor-driven ratchet arrangement at 1 revolution per minute.

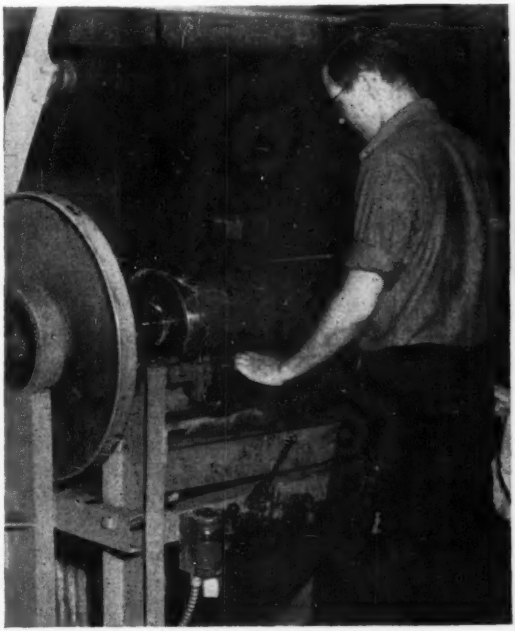


Fig. 5—Illustration shows a copper plated roll on which has been placed the gelatin film containing the design to be etched into the copper.

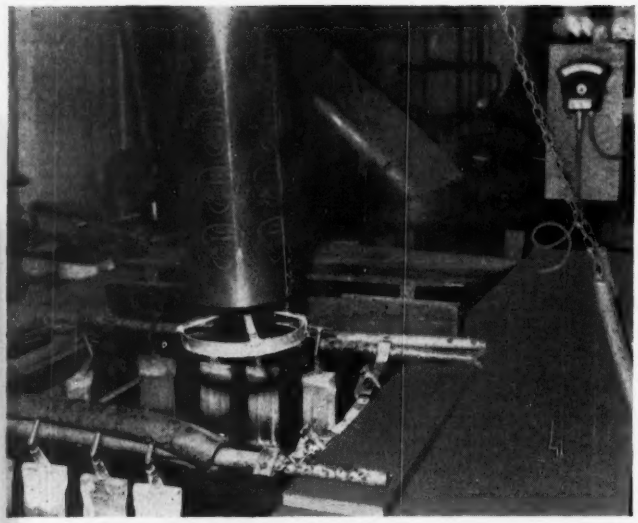
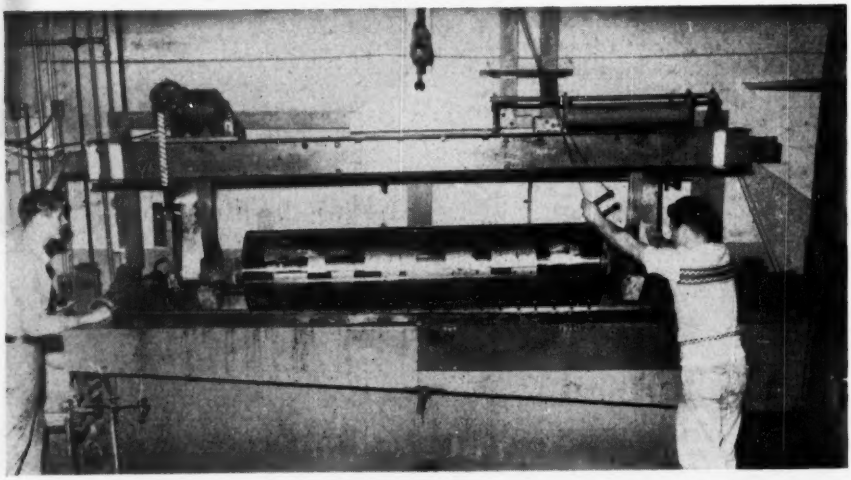


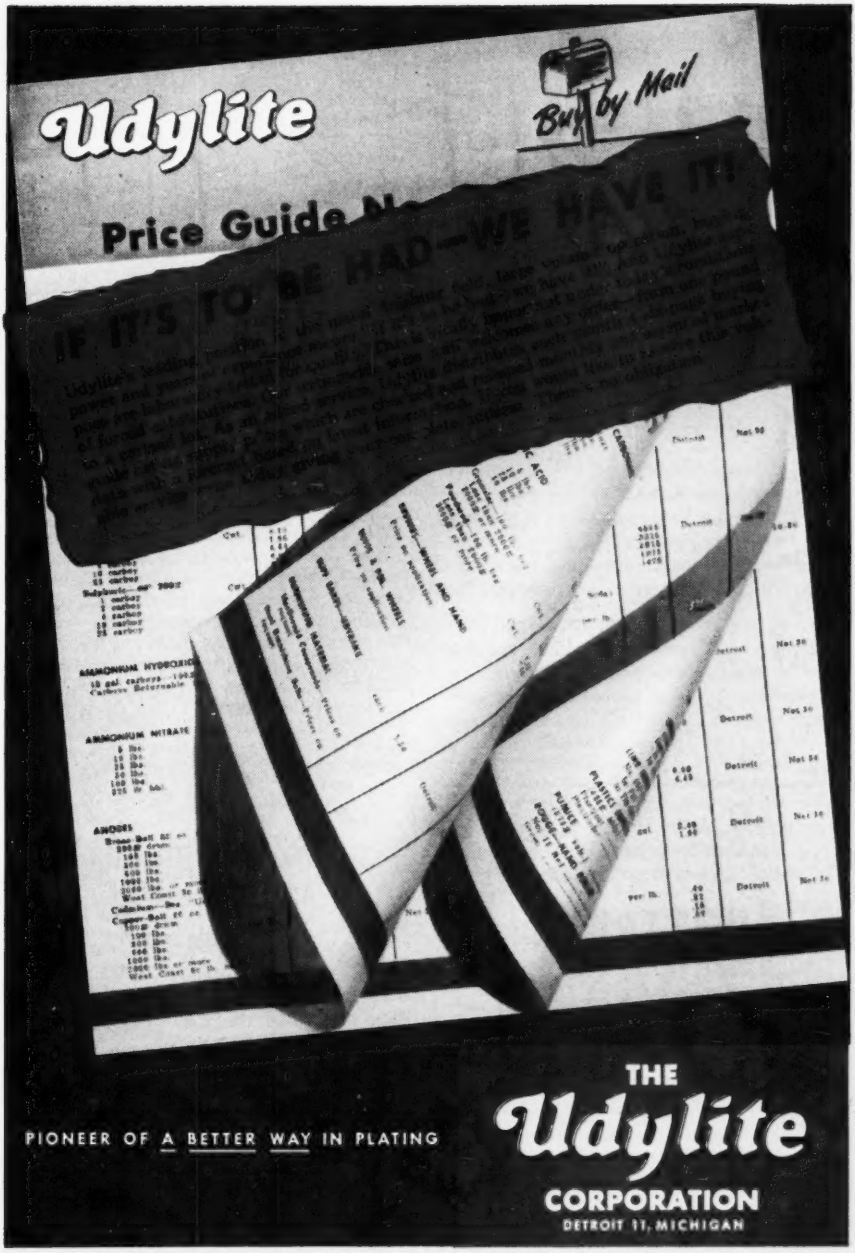
Fig. 6—In one of the two chromium plating tanks at Southern Gravure Service, Inc., copper plated and etched rolls are chromium plated while mounted in a vertical position. This view shows a roll ready to be lowered into the tank for chromium plating. In the right background may be seen the Sarco LSI temperature regulator and controller.

This tank employs a solution of the same composition as that described for the smaller tank, but is operated at a lower temperature (110 to 115 deg. F.) and a lower current density (1 amp./sq. in.). In addition to a Sarco automatic temperature control, provision is made so that cold water may be run through

Fig. 7—The larger printing rolls are plated in a horizontal position in another chromium plating tank. This illustration shows how the rolls are mounted for plating. At the left is shown the motor and speed-reducing mechanism with ratchet device which is used to rotate a roll during the plating process.

(Photos by PRODUCTS FINISHING)

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We know how to formulate Thinners to your requirements—been doing it for 26 years. We've satisfied big and little customers . . . let us show you how a Lacquer Thinner *SPECIALIST* can supply you with the *right* Thinner . . . and still save you money.

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We use Lacquer Thinner on:
☐ Metal ☐ Wood ☐ Other_____
We want it to dry:
☐ Fast ☐ Slow ☐ Medium

Name_____
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the lead heating coils to cool the solution if necessary. Since up to 10,000 amperes may be required for plating, this solution is subject to heating as a result of the passage of electric current, and hence the manually-operated cooling facilities are necessary.

Chromium plated rolls are removed from the plating solution (handled always by electric hoists), rinsed above the tank to recover the chromium solution, then transferred to a rack or dolly. Thorough rinsing and drying operations follow.

Completed rolls are polished to a mirror finish with Behr-Manning 400 Speed Wet or 3M Wetodry emery paper mounted on a rubber padded block. The rolls are then carefully packed for shipment to printing plants.

ACKNOWLEDGEMENT

The author acknowledges with sincere thanks the cooperation and assistance of T. K. Allison, plant engineer, Southern Gravure Service, Inc., in assembling the information incorporated in this acticle. Mr. Allison, formerly quite active in the Indianapolis Branch, American Electroplaters' Society, is a charter member of the Louisville Branch.

Comparative Testing of Metal Coatings

By GILBERT C. CLOSE

ONE testing device is used extensively in the laboratory of the Western Steel & Construction Company, Los Angeles, for comparative testing of coating materials on metals. All metal specimens may be coated with the same material and exposed to different solutions, or conversely, different coating materials may be exposed to the same solution. The controlled results give very reliable information.

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LIKE CHROME

IRIDITE

If your problem is finding the right finish to replace conventional chrome plating, follow the lead of prominent manufacturers of all types of products . . . switch to zinc plate and Iridite Bright.

Here's what you get when you use this chromate finishing system to replace conventional chrome plating.

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The zinc plate and Iridite Bright system resembles chrome so closely that visual inspection can scarcely tell the difference! And, the brilliance *lasts.*

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Yes, you actually get better protection with zinc plate and Iridite Bright than with chrome plating . . . up to twice the life under accelerated salt spray conditions! And, by applying a clear baking lacquer over the Iridite coating you can increase the abrasion resistance and lasting qualities of this bright finishing system, at the same time making possible a greater salt spray protection.

LOWER FINISHING COSTS

One metal, zinc, replaces three so you save material costs and plating time. Iridite Bright goes on in a non-electrolytic chemical dip.

Write or call today for your copy of our new Technical Bulletin describing all phases of this bright finishing system in detail. Tell us your bright finishing requirements. If possible send sample parts for test processing.

Iridite is approved under government specifications

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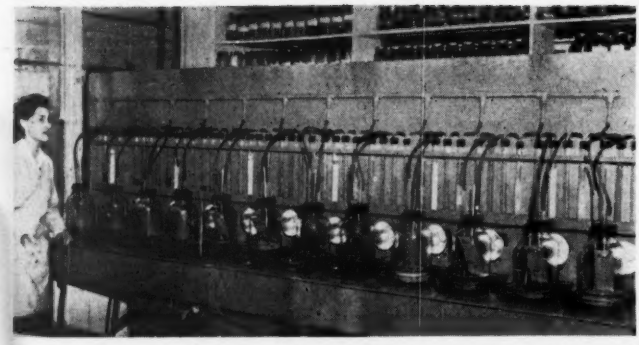


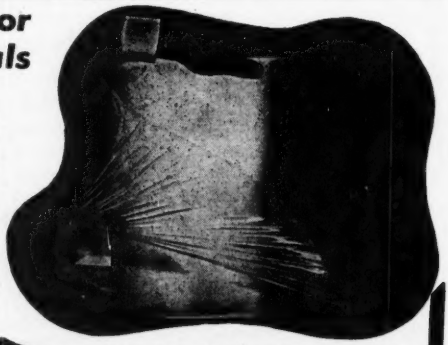
Testing apparatus used by the Western Steel & Construction Company.

The apparatus is economical and can be home-built. It consists of as many half-gallon wide-mouth jars as is required for the test. Each jar is fitted with a two-hole rubber stopper for the glass air tubes which are connected through tubes containing a dehydrating agent to remove moisture. The outgoing air tubes lead into another glass tube which can be used for forming airborne precipitates, and so on.

The constant air pressure to each jar assures uniform agitation in each test. The dehydrating agent removes impurities from the incoming air which in themselves might be corrosive and influence the test and therefore the results.

Funny thing about temper. You can't get rid of it by losing it.—*The Ohio Engineer.*

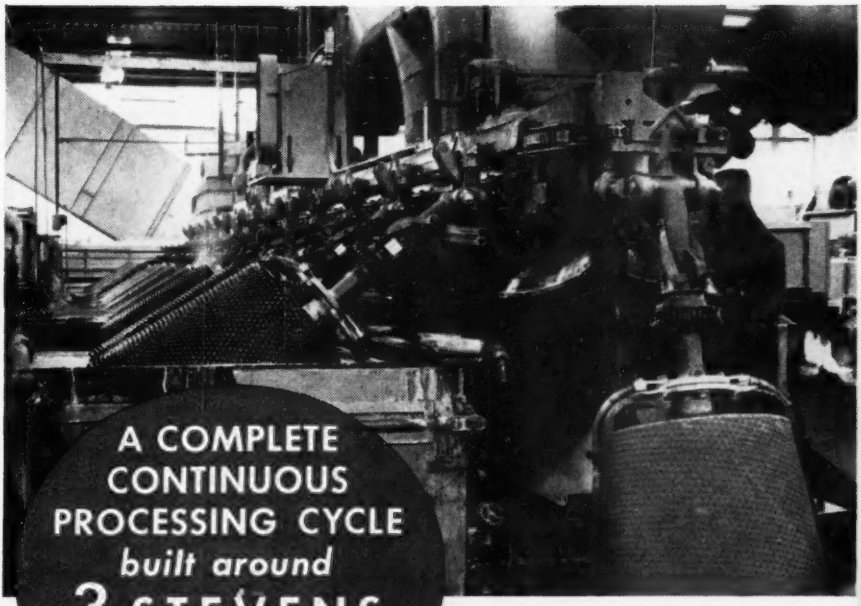
A Strippable Plastic for the Protection of Metals



Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.

THE STRIPLASTIC COMPANY
10828 QUEBEC AVE.
CLEVELAND 6, OHIO

Among many advantages, it is nontoxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.



A COMPLETE CONTINUOUS PROCESSING CYCLE *built around* 3 STEVENS *AUTOMATIC* PLATING MACHINES

Shakeproof, Inc., Elgin, Illinois, is realizing new operational economies with their Stevens Full Automatic installation for complete processing of small, stamped and cold headed fastening devices. The entire processing cycle is automatic and includes cleaning, plating, rinsing, bright dipping and drying. Two Stevens Full Automatics are used for zinc and cadmium plating while a third Stevens unit is used for phosphatizing parts requiring such treatment. According to Shakeproof, their Stevens continuous processing installation gives better control of plating thicknesses, fewer rejects, cleaner operation with reduced operating manpower requirements, and absolute minimum material handling costs because of its straight-flow operation.

You can bring these same benefits to *your* plating operations with Stevens equipment. Have your Stevens representative show you all of the advantages offered by Stevens Full Automatic Plating Machines. Or, write direct to *Frederic B. Stevens, Inc., Detroit 16, Michigan,* for full details.

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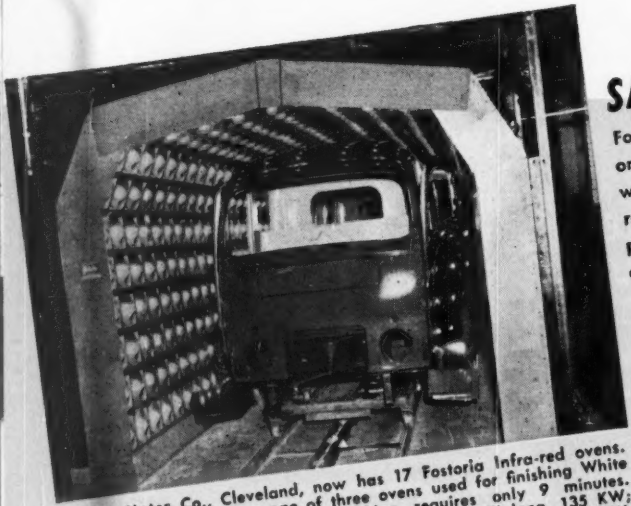


White Motor Co., Cleveland, now has 17 Fostoria Infra-red ovens. The photo above shows one of three ovens used for finishing White 3000 series Power Lift Cabs. Baking requires only 9 minutes. Operating cost is reasonable — dry-off oven, 18' 4" long, 135 KW; prime oven, 29' 4" long, 144 KW; finish oven, 29' 4" long, 128 KW.

SAVES SPACE

Fostoria Infra-red ovens operate on a comparatively short cycle which results in smaller oven requirements. They may be suspended from ceiling mounts to eliminate floor space entirely.

SAVES TIME

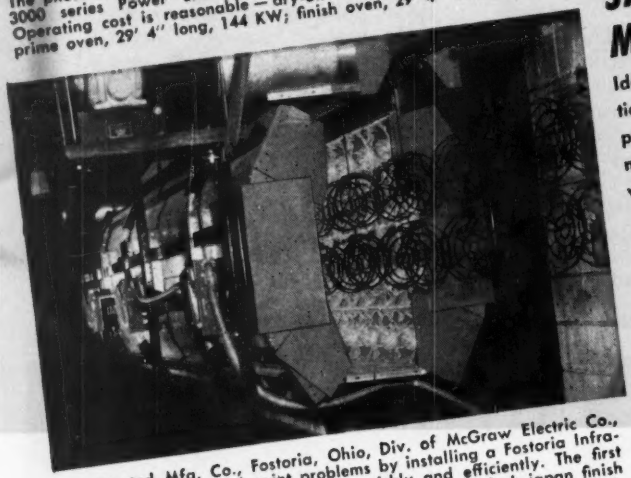
Reduces processing time from hours to minutes because of the inherent speed of Infra-red. There is no time lag in starting an oven. Heat is instantaneous.

SAVES MANPOWER— MANHOURS

Ideal for conveyorized production methods. Reduces expensive product handling. Turns out more pieces per day with ease, with less people.

CUTS COSTS

Faster production, lower operating costs, improved quality, result in lower "per piece" cost.



The Bersted Mfg. Co., Fostoria, Ohio, Div. of McGraw Electric Co., solved degreasing and paint problems by installing a Fostoria Infra-red oven. Fan guards are finished quickly and efficiently. The first trip through the oven, light oil is burned off. Then black japan finish is baked in 4 minutes. Production is 6,000 pieces per day. Oven is ceiling mounted saving floor space.

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You'll be amazed at the savings you can make in space, time, manpower and costs — the marked increase in the efficiency and quality of your finishing production—by modernization with a Fostoria Engineered Infra-red Oven. *A Fostoria Infra-red System out-performs any other equipment on the market today.* Fostoria exclusive engineered features guarantee the fastest, finest finish baking at lowest "per piece" production cost. Bring your finishing production facilities up to date by modernizing, now, with Fostoria Infra-red. Case histories of installations applicable to your production are available on request.

GET THE COMPLETE FACTS!

Write, today, for factual folder on the Fostoria Infra-red System. Technical data application to your operations will be included if you send us general facts about your problems.

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INFRA-RED fostoria SYSTEM

PRESSED STEEL CORPORATION, Fostoria, Ohio

Oldest and Largest Manufacturers of Industrial Infra-red Ovens

A large segment of the automotive field is devoted to the production of passenger buses for a variety of services. Buses are now being manufactured in order to meet demands for new equipment which is needed for the replacement of worn out and obsolete types, for the replacement of other means of transportation, for the establishment of new transportation systems, and for charter and sightseeing purposes.

One of the companies engaged in the production of passenger motor buses is the General American Aerocoach, Motor Coach Division of General American Transportation Corporation, with shops at East Chicago, Indiana. Several different types of motor coaches are built by the organization, including those used for long haul or interstate buses, those used for local or intrastate service having center exit doors, and the "Astraview" sightseeing buses with roof windows. Shown in the article heading is a typical long haul type coach produced at the plant.

The purpose of this article is to emphasize the use and importance of gas fuel as it contributes to the finishing operations in bus construction. For practical purposes, it may be said that bus building at the Aerocoach plant is done on a "production line" basis, as the frames are moved along on "dollies" until the wheels and tires are attached.

Aerocoach buses are chassis-less type vehicles in which square, rectangular, and round steel tubing sections are welded together to form sub-assemblies. The major sub-assemblies for a single bus are the front end, rear end, roof, sides, and floor. The sub-assemblies are integrally welded together to complete a main frame which is then cleaned and coated with preservative paint. Cleaning is accomplished by hand methods using N. J. 2, produced by William J. Hough & Company, Chicago. Rust spots are treated with Neilson Metalprep No. 10. The frame is then placed in a Binks water-washed spray booth and painted with DPE 1084, a red oxide oil primer manufactured by the Ditzler Color Division, Detroit. The frame is then air dried.

The all-welded tubular steel frames provide a high structural strength and

Aerocoach Bus Finishing Aided by Natural Gas

By ARTHUR Q. SMITH
American Gas Association
New York

a light weight; and units, such as springs, steering gears, power plants, and so on, are attached directly to the frames. A view of the production lines in the plant is shown in Fig. 1. On the extreme right may be seen a number of all-welded frames constructed of the steel tubing sections. Other production lines show coaches in the process of being constructed.

After the framework for a bus has been completed, aluminum panels for sides, roof, and ends are fastened by means of special thread cutting screws fitted with internal tooth lock washers. Then, after the wheels and tires are attached, the coach is ready to be painted.

Five Binks spray booths of the water-washed type, one of which is shown in Fig. 2, are used for the painting of the coach exteriors and interiors. Each booth is equipped with a hydraulic plat-

Fig. 1—A view of various production lines at the plant of General American Aerocoach, East Chicago, Indiana.

form hoist so that the platforms may be raised or lowered as different coach sections are sprayed, thus eliminating the necessity of using scaffolds. The booths are also equipped with electrically operated doors.

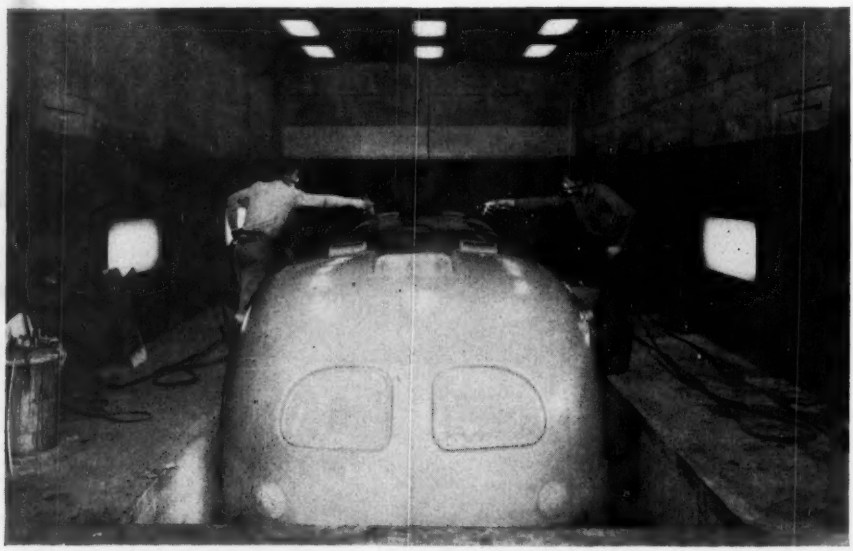
The painting procedure consists of eight stages. The coach is first cleaned and prepared for a coat of primer surfacer at a cleaning deck. The second stage takes place in a spray booth. All bare metal surfaces are spot primed with Ditzler zinc chromate primer UC 30470, and metal surfaces both inside and outside of the coach are sprayed with two coats of Ditzler synthetic primer surfacer DZE. Except for the baggage and engine compartments, the surfaces are next sprayed with two coats of Ditzler gray enamel (DE 300-43G). The coach is then removed from the spray booth and dried in one of four gas-fired Newcomb-Detroit ovens at 180 deg. F. for approximately 45 minutes.

Stage three consists of sanding the interior and making it ready for the application of interior colors. At stage four, in a spray booth, four coats of lacquer are applied using the interior color requested. When partially dry, the coach is placed in an oven for 20 minutes for further drying at 170 deg. F. If more than one interior color is required, the operations are repeated after masking off the color which has already been applied.

At the fifth stage, which takes place at the sanding deck, the exterior of the coach is completely sanded and washed off, and the coach is moved into a spray booth. Then, at stage six, the stripe color, which has been specified by the customer, is applied in either lacquer or enamel, as required. After the stripe color has been applied, the coach is placed in an oven and dried at 180 deg. F. for approximately 40 minutes.

After the coach has cooled, the operations of the seventh stage begin.

Fig. 2—Coach exteriors and interiors are sprayed in water-washed spray booths such as the one shown here. A hydraulic platform hoist is positioned in the center of each booth so that all parts of a coach may be sprayed conveniently.



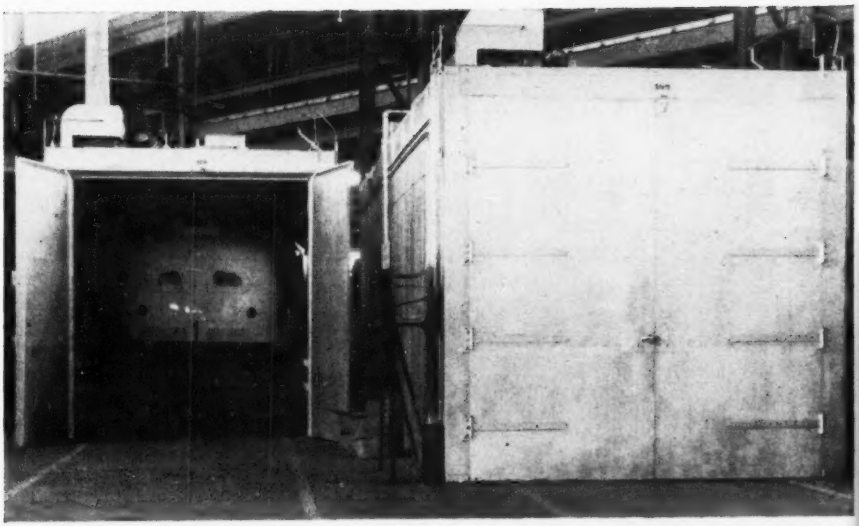


Fig. 3—An entire motor coach may be accommodated in each of the four gas-fired paint drying ovens in the plant, two of which may be seen here.

The coach is placed in a spray booth, and the second color of exterior paint is applied. After the application of the second color, the coach is again moved to an oven for drying.

At the eighth and last stage, the coach is again placed in a spray booth; and, after the colors already applied have been masked off, the next color is sprayed on. The coach is then moved to an oven for the last drying at 180 deg. F. for 40 minutes. Most of the coaches produced at the plant are painted with one stripe and two body colors. However, should additional colors be desired, the operations of stage eight are repeated until the job is completed.

Each of the four drying ovens, two of which are shown in Fig. 3, is large enough to accommodate an entire motor coach. The coaches are pushed into and pulled out of the ovens by means of small shop tractors which also move the coaches around the shop for the various assembling operations. The drying ovens are of the forced circulation, partial recirculation type with fume exhausters. Heat is supplied to each oven by means of 70 Burdett radiant cup burners, 35 being positioned along each side near the floor (see Fig. 4). A circulating fan on the roof is utilized to force air through ducts which have their ports above the burner line, thus entraining the heat from the burners and circulating the warm air around the coach to exhaust ports along the top wall. Gas is supplied to the burners through Eclipse low pressure proportional mixers manifolded to the center of each burner bank, and burners are equipped with spark ignition and Wheelco Flameotrols. Each of the four ovens has a 2,000,000 B.T.U. input. Full-automatic Partlow temperature controls are used to provide exact and even heat for the drying operations. Production is scheduled so that the paint drying ovens are in continuous use.

Small body parts are attached after the coach proper is painted, and these

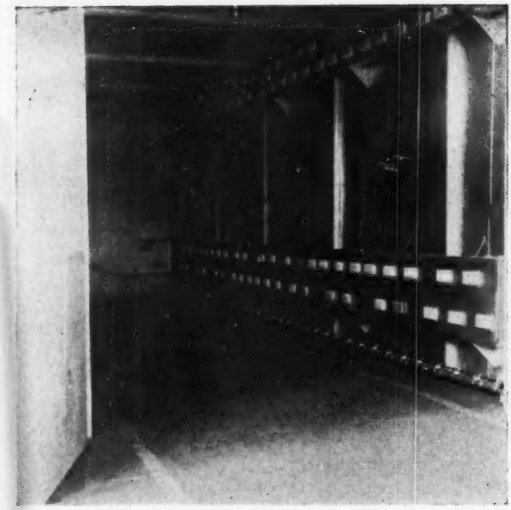


Fig. 4—There are 70 gas-fired radiant burners in each paint drying oven, 35 along the bottom of each side. Incoming air enters through the duct ports of the lower bank, and the exhaust ports are at the top.

small parts are finished separately. The parts are first cleaned by pressure spray washing in a three-stage washing machine manufactured by the International Conveyor & Washer Company, Detroit. The parts are passed through the machine on an overhead trolley conveyor having a speed range of 4 to 16 feet per minute.

Before steel parts are placed on the conveyor for washing, any rust present is removed either by a hand application of Neilson Metalprep No. 10 or by immersion in a hot dip tank containing a solution of the Industrial Chemical Products Company's Sol-Klean 1121. The parts are then rinsed in a solution made up of two parts water and one part of Sol-Klean 1121.

In the washing machine, the tank capacity at the first stage is 2,056 gallons, and the temperature used is 180 deg. F. Sixty pounds of Industro Cleaner 2X, manufactured by the Industrial Chemical Products Company, are required to charge the tank. The solution in this tank, as well as in the other two tanks, is heated by means of Eclipse high pressure gas inspirator immersion burners with Ferofix nozzles and a direct exhaust. The heat input to the immersion burners at this first stage is 2,000,000 British Thermal Units.

At the second stage the parts are given a clear water rinse in a tank having a capacity of 1,610 gallons and operated at 180 deg. F. The input to the immersion burners at this stage is 1,500,000 British Thermal Units.

The third stage consists of a water rinse with a one per cent Phosmul solution in a tank having a capacity of 1,610 gallons and maintained at 180 deg. F. After being passed through this last stage of the washing machine, the parts are drained for a distance of 10 feet and then moved into a 40-foot long drying oven operated at 250 deg. F. The last sections of both the washing machine and the drying oven may be seen in Fig. 5. The Newcomb-Detroit oven is a continuous, gas-fired, conveyor type having 99 Burdett radiant cup burners on the floor, arranged in three rows of 33 each. Air is circulated through the oven at approximately 300 deg. F., and the total input to the burners is 2,750,000 British Thermal Units.

After leaving the oven, the parts are carried for a distance of 50 feet to the Binks water-washed type spray booths. As the parts are passed through the spray booths, they are painted with a light coat of Ditzler UC 30470 zinc chromate primer and then dried in a baking oven at 300 deg. F. This proced-

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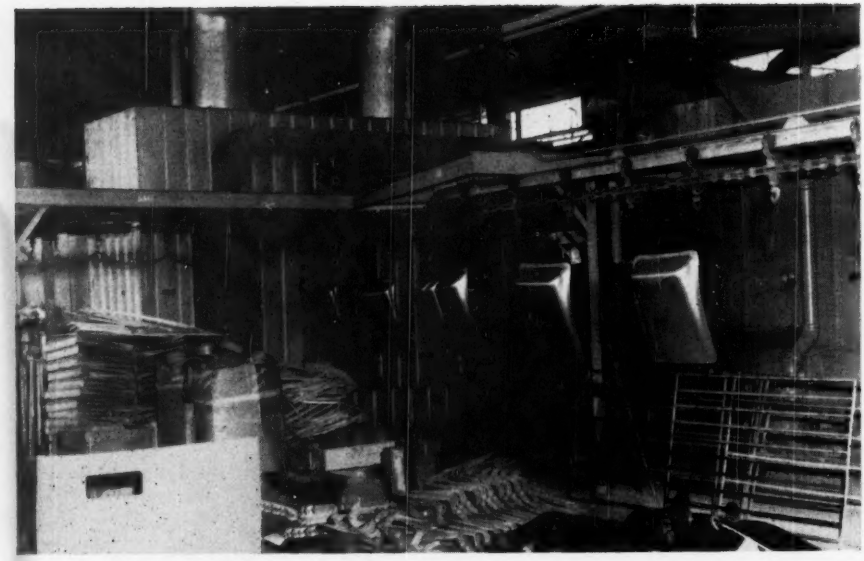


Fig. 5—Small parts for motor coaches are finished separately. They are first cleaned in a three-stage washing machine, the last section of which may be seen on the right; and then they are dried in a 40-foot-long oven, the last section of which may be seen at the left, before being carried to spray booths for further treatment.
(All photos courtesy General American Aerocoach, East Chicago, Ind.)

ure is applied to all steel and aluminum parts for which additional paint operations are required. The procedure is used to protect metal parts from corrosion during storage, and to provide adhesion for additional applications of paint. Parts requiring a black enamel finish are handled in a similar manner with the exception that Ditzler DE-9004 black enamel is substituted for the zinc chromate primer.

It may be said that the various gas applications in this plant are important factors in maintaining high production schedules.

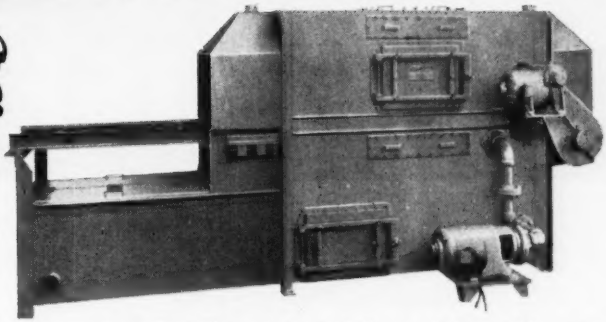
Permanent Gloss Standards Aid Finish Inspection

PERMANENT gloss standards, covering the entire gloss range of non-metallic commercial materials, are available from the National Bureau of Standards. These standards, as shown in Figures 1 and 2, which may be used to calibrate any 60-degree specular glossmeter in the range from matte to high gloss, are made of ceramic materials for permanence, and the surfaces have been specially chosen for similarity to commercial materials whose gloss is important. Sets of the 60-degree specular gloss standards may be ordered from the National Bureau of Standards, Washington 25, D. C., for $70.00 a set.

Measurement of gloss is becoming increasingly important in many industries. Building interiors must range from semi-gloss to matte to prevent eye strain caused by reflected images of the light sources. Gloss of a paint finish should always be adjusted to the

to page 36→

★ EFFICIENT Defense Production CALLS FOR EFFICIENT Cleaning Methods!



During — and after — the "Second World War" vast improvements in product cleaning methods were inaugurated!

Pictured here, is an A-F Washing Machine which typifies the modern, fast, *efficient* way to remove cyanide from hardened gun parts.

This special A-F Machine with "slo-flo" tank allows cyanide to settle out of the solution—with special arrangements to remove the settling. By simply removing plates, all wash pipes can be cleaned inside without disconnecting the wash system!

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● **Pittsburgh** has the research and technical skill—as well as many years of experience in working with varied industries—to enable it to adapt specification materials that will assure trouble-free application under the production conditions prevailing in your plant.

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Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

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GLASS COMPANY

use of the finish. Outdoor finishes, such as automotive enamels, have high gloss for permanence. Gloss measurements are also important in defining the wear resistance of plastics and ceramics.

The gloss measurement is essentially a simple one. When a specimen is illuminated at some angle from the perpendicular, the proportion of the light reflected at angles near that of mirror reflection is defined as gloss. A critical part of the definition of gloss, however, is the amount that the reflected beam may depart from the strict direction of mirror reflection and still be counted as contributing to gloss. With glossmeters commercially available at the present time, replacement of the lamp, for example, may introduce instrumental errors unless readjustment is made. The new gloss standards permit a rapid check of instrument calibration at any time and provide a basis for readjustment of the instrument if required.

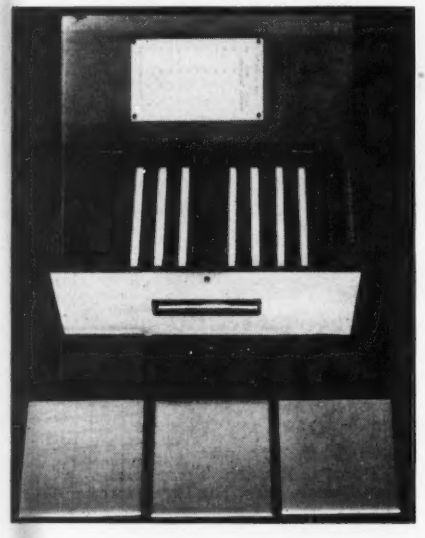


Fig. 1—The new National Bureau of Standards gloss standards provide a useful reference for the surface qualities of non-metallic commercial materials over the range from high gloss to matte. The high, medium, and low gloss ranges are illustrated by these three tiles which have been removed from the box in which the set of standards is issued. The plaque on the left, which produces a reflected image of a grid above, is a high-gloss Vitrolite plaque.

(Photographs courtesy National Bureau of Standards, Washington 25, D. C.)

The gloss standards have been prepared according to ASTM Method D523 for the 60-degree Specular Gloss of Paint Finishes. A set consists of two white Vitrolite plaques having nominal gloss values 1 to 90, and eight glazed ceramic plaques with nominal gloss values 10, 20, 30, 40, 50, 60, 70, and 80. Each plaque, which is approximately 4¼ inches square, is engraved with the nominal gloss value followed by a serial number. The edges and backs of the ceramic plaques are coated with glyptal cement to prevent absorption of water.

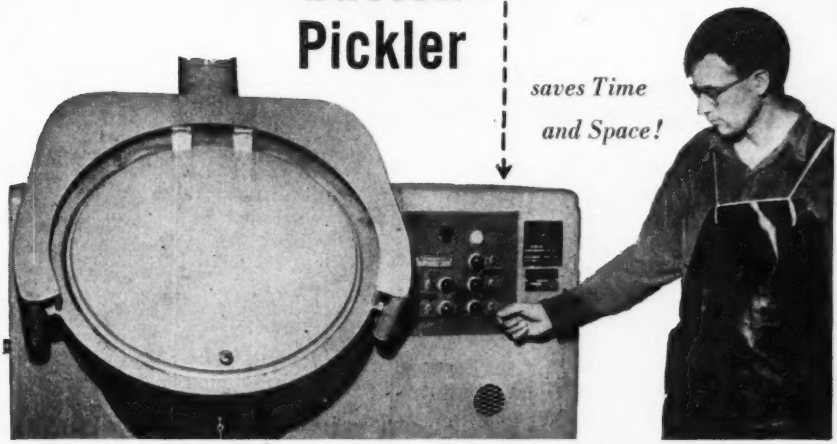
The plaques are measured for 60-degree specular gloss according to the ASTM method, using a glossmeter calibrated with the gloss reference standards of the National Bureau of Standards. These measurements include both the true gloss and a diffuse reflectance component. Corrected gloss values are obtained by subtracting the 0-60-degree luminous directional reflectance measured with an ASTM receiver aperture. The corrections for each standard are included in the certificate accompanying each set. The gloss values for standards above 15 are given to the nearest gloss unit, below 15 to the nearest tenth of a unit.

Since glossiness is a surface reflection characteristic, the condition of the surface must remain unchanged if the reported gloss values are to remain valid. The surfaces of the standards have been found to be reasonably permanent, but they must be protected from dirt and abrasion.

Even with the aid of standards it is not possible to do precise gloss meas-

Push-button Pickler

saves Time and Space!



This General Electric installation for automatic pickling was designed and built by the American Machine and Solvents Co., New York, N. Y.

Portable and with easily adjusted controls, this equipment is adaptable to changes in production flow

A new type of pickling machine is saving time, labor, and other operating costs for the General Electric Company, Schenectady, N.Y.

The pickler was specially designed to fill that company's need for an automatic pickling unit for small parts.

The unit is completely automatic and is operated by a series of easily adjusted timer switches. At the end of a cycle of rinses and muriatic acid baths, the machine automatically stops and sounds a "finish" signal. It is compact (about the size of an office desk), and is easily moved from place to place.

All parts of the unit subjected to abrasion or pickling solution are made of high-strength, corrosion-resistant Monel®. The designers chose Monel because of its long life under severe impacts and hard usage, *even when used in relatively lightweight cross-sections.*

Today, much Monel is being diverted to defense applications. However, for present needs or for future equipment, you can learn more about Monel's use in pickling by writing for your copy of "5-Way Savings in Pickling."

For help in specific pickling applications, you can always get advice from Inco's Technical Service Section.

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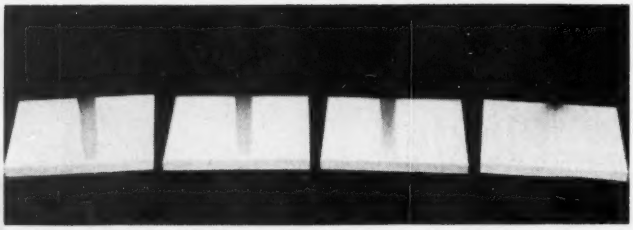


Fig. 2—The National Bureau of Standards gloss standards here illustrate specular gloss. The distinctness of the images reflected from these gloss standards show a type of gloss related to specular gloss and more readily depicted photographically.

urement in the medium to high gloss range unless the glossmeter used meets very closely the aperture requirements of ASTM Method D523, or unless the reflected light flux distribution of the specimen and standard are nearly identical. Since it is not practical to meet the latter requirement, it is desirable to make a test for the former. This may be accomplished by adjusting the instrument to read correctly the gloss of a highly polished surface, such as the "90" standard, and then reading the gloss of a high-gloss surface having poorer image-forming characteristics, such as the "80" or "70" standard. If under these conditions the instrument reading for the second standard does not agree closely with the reported value, the instrument should not be used for high-gloss measurement without readjustment, preferably by the manufacturer.

For proper use of the gloss standards the following recommendations should be followed:

1. Clean standards before use. Standards should be washed with soap and warm water, rinsed, and dried over night. Standards with gloss value lower than 25 should be scrubbed lightly.

2. Handle the standards carefully to avoid abrading the surfaces. One or two deep scratches are not as serious as a large number of small, almost imperceptible ones.

3. Back translucent plaques with opaque materials to prevent room light from affecting gloss readings.

4. For greatest precision, use standards oriented as they had been during the original measurements.

—*National Bureau of Standards Technical Report* 1383.

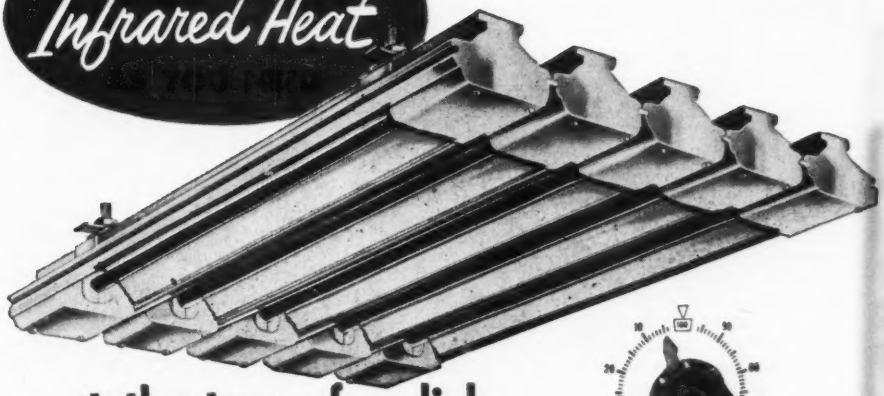
Check Solvent Safety Before Winter Comes

As the end of summer approaches, ventilating arrangements and other safeguards intended to protect workers in solvent-using departments should be re-examined.

During the summer months, it may be that natural ventilation from windows and doors has taken care of some of the load of removing solvent vapors. With the drop in temperature, this source of ventilation will be cut off and other means of vapor removal, such as mechanical ventilation, will increase in importance. It is therefore desirable to check ventilating systems before the winter season to make certain that they are adequate, functioning properly and in good repair.

During warm weather, occasional jobs with solvents may be done outdoors. When such work is moved indoors, respirators are often depended upon to prevent vapor inhalation. Respirators, too, should be checked to make certain that they are in good condition and ready for use. Where canister-type respirators are provided, it is important to check the service record of the canisters to assure that their contents are still useful.

Infrared Heat



at the turn of a dial . . .

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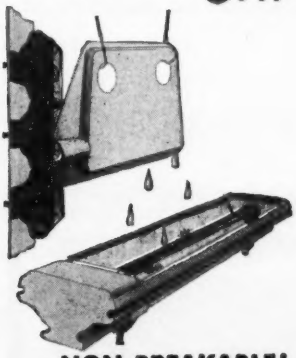

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Shocks, vibration, steam, splashed liquids do not damage Chromalox Radiant Heaters. There's nothing to break, nothing to shatter, nothing to contaminate work.

With CHROMALOX Electric Radiant Heaters you can dial and get precise temperatures needed for baking, drying, degreasing and other finishing applications. Ovens using Radiant Heaters can be zoned for stepped-down or stepped-up temperatures to meet the needs of the job.

CHROMALOX Radiant Heaters operate in low or high ambient temperatures; give glareless radiation in far-infrared wave lengths which are efficiently absorbed by all colors, textures and surfaces; are safe where volatiles are present. Light, dark and multi-work can be processed simultaneously; proper heater positioning assures an even blanket of heat without hot spots. All-metal construction withstands shock, vibration, rough handling and is not affected by splashed liquids. Units are compact, flexible, easy-to-install in your present equipment.

For more "know-how"

Write for Application File which shows how to increase production and reduce finishing costs with Chromalox Radiant Heaters and gives complete details on these versatile, efficient units. IC-51

CHROMALOX *Electric Heat for Modern Industry*

EDWIN L. WIEGAND CO., 7552 Thomas Blvd., Pittsburgh 8, Pa.

Winter months may bring an increase in dermatitis, because of the increase in dry, chapped skin. A good lubricating cream, provided near the washstand, will be helpful in preventing skin difficulties from solvents.—*Safety Research Institute.*

According to studies analyzed by the Color Research Laboratory of the Sun Chemical Corporation, New York, physical effects from color are not only possible but unavoidable. Several authorities have agreed that there are certain direct connections between the eye, the brain and the muscles and organs of the body. Sudden motion or brightness may cause the head to dodge involuntarily and the eyes to blink. Under the stimulation of bright lights and vivid hues, muscular tension will increase—and with this increase will go a rise in blood pressure and pulse rate. On the other hand, dim lights and soft, cool hues will release tension and cause blood pressure and pulse rate to drop.

Such reactions have also been observed in blind individuals. The evidence seems to be that the body has a radiation sense. It will, of course, grow tan under the action of ultraviolet (invisible light). But less known today is that visible colors—red, yellow, blue—also have a physiological influence. In other words, human bodies, like plants, are quite sensitive to color and visible light energy.

A porcelain enamel that bends has been developed by a Midwest stove manufacturer. This material has made possible substantial savings in storage space and faster production. This exceptionally thin coating—only approximately 0.003-inch thick—is applied to flat sheets before they are formed into stove and oven liners.

Never leave till tomorrow what you can do today.—*Ben Franklin.*

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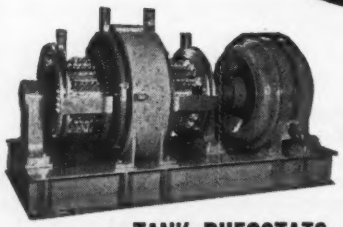

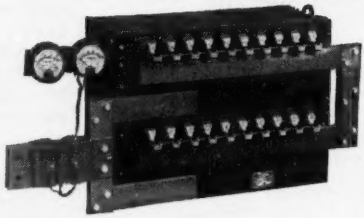

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... While Removing Oxide Scale Quickly and Completely

Nopco 1067-A has a unique ability to reduce surface tension in mineral acid solutions. This means it affords *high drain-off* of the acid solution during pickling, resulting in appreciable savings of sulfuric acid in pickling baths.

In addition, Nopco 1067-A permits complete acid removal to be achieved with fewer rinsings, and reduces the possibility for acid contamination during operations following pickling.

In a word, the addition of this unusual liquid surface tension depressant to acid solutions offers the following important advantages:

Savings of sulfuric acid solution—since, on the average, carry-over losses can be cut 30% to 40% . . .

Savings in time and labor—since better drain-off means fewer rinsings . . .

Savings in operations following pickling—since thorough acid removal prior to such operations prevents contamination of lubricants, and thus increases life of dies and other tools . . .

PLUS faster, deeper, and more uniform penetration of oxide scale.

In the light of current restrictions on the use of sulfuric acid, you'll find Nopco 1067-A exceptionally helpful in any type of acid pickling—plating, wire manufacture, galvanizing or anodizing.

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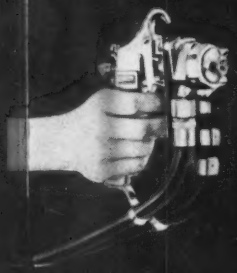

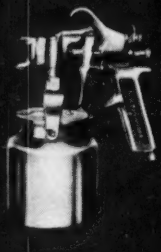

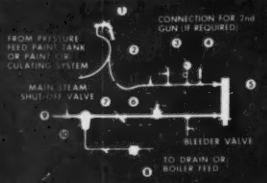
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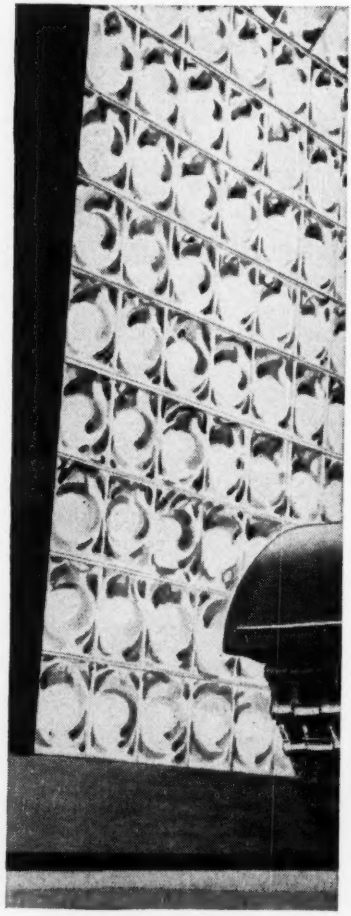
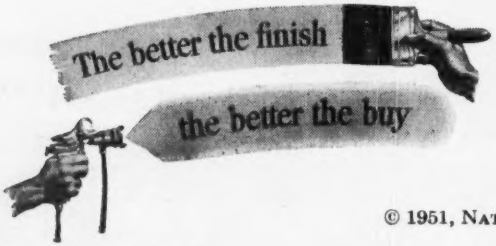
When you move into defense production, military specifications are important, and you find you're fighting time schedules to meet production. So consult an Industrial Finishes Specialist. He can help solve some of your problems.

The nation's Industrial Finishes manufacturers have met new requirements and reduced finishing time for literally thousands of defense products. In the manufacture of tanks, for instance, Industrial Finishes Specialists helped cut production time by two weeks!

So call in an Industrial Finishes Specialist. Whether your problem is production for defense or production for civilian uses, you'll find he has a vast backlog of practical experience to help you meet new specifications, to cut finishing time, lower production costs, and to keep your products rolling off the line. Remember—in times of emergency as in normal times—more and more of your customers *start buying with the finish in mind!*



Be sure to consult an Industrial Finishes Specialist!



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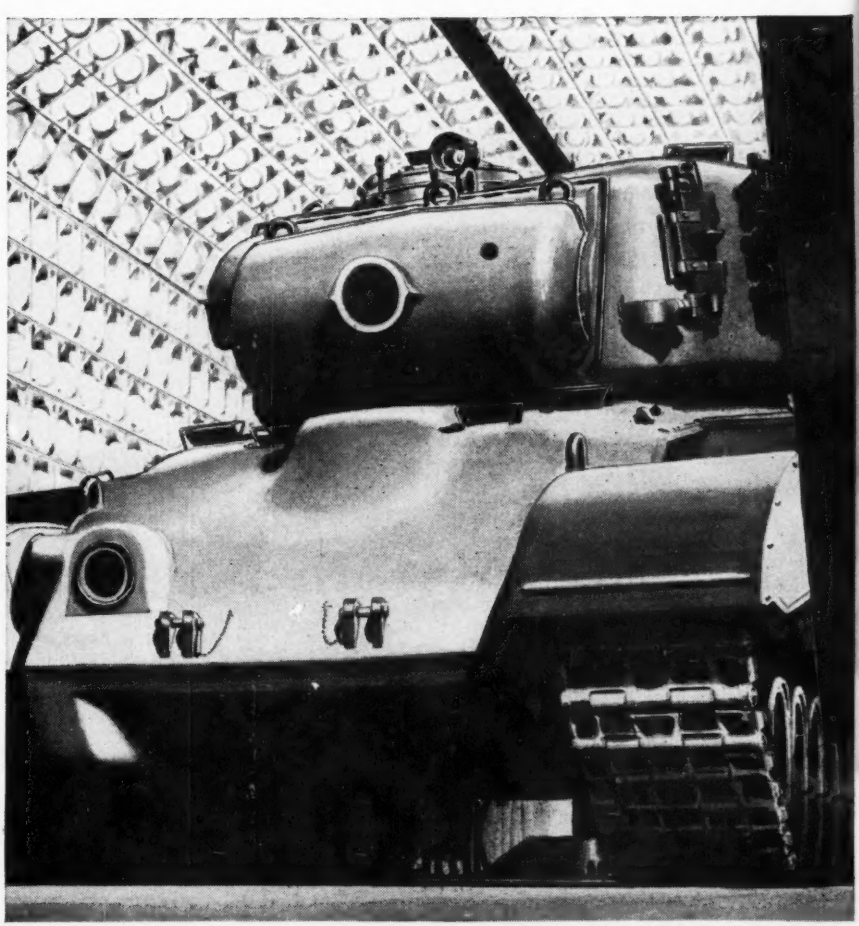
defense order of the day!



Drying finish on M-26 medium tank.

ASSOCIATION, INC., WASHINGTON 5, D. C.

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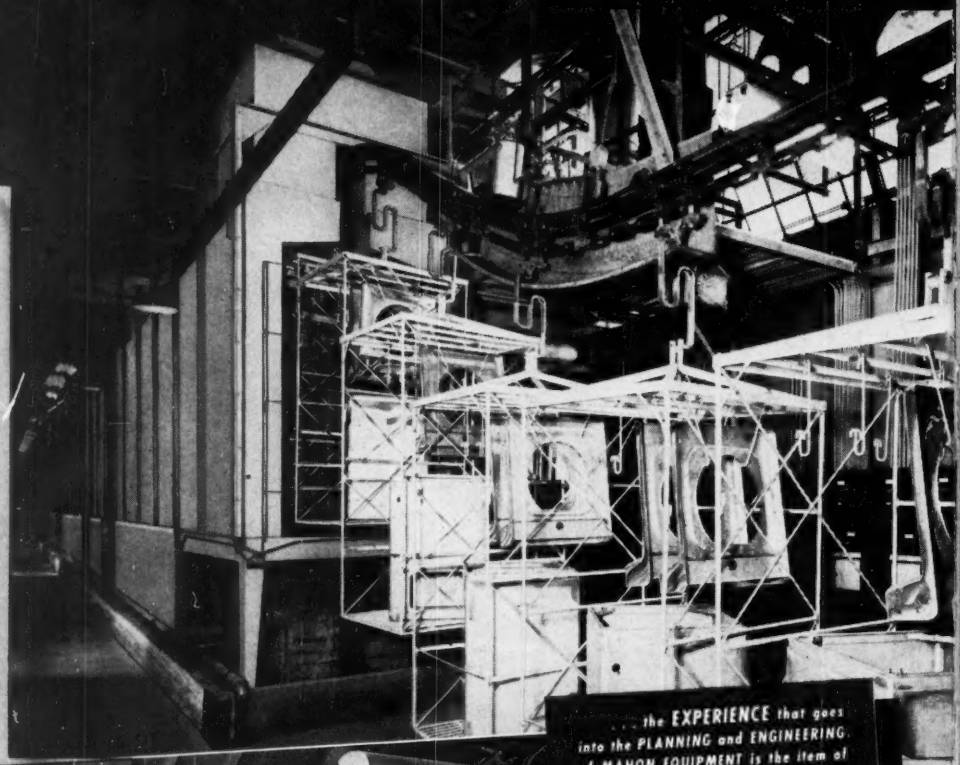

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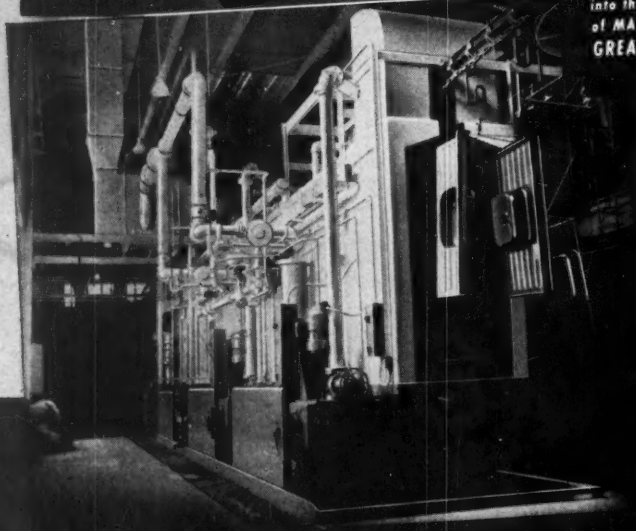

The Mahon Cleaning and Pickling Machine illustrated above was installed as part of a complete Mahon Finishing System in the plant of one of the world's largest manufacturers of Household Appliances. The three installations illustrated on these pages are representative of others serving various industries engaged in Porcelain Enameling Operations in connection with their products.

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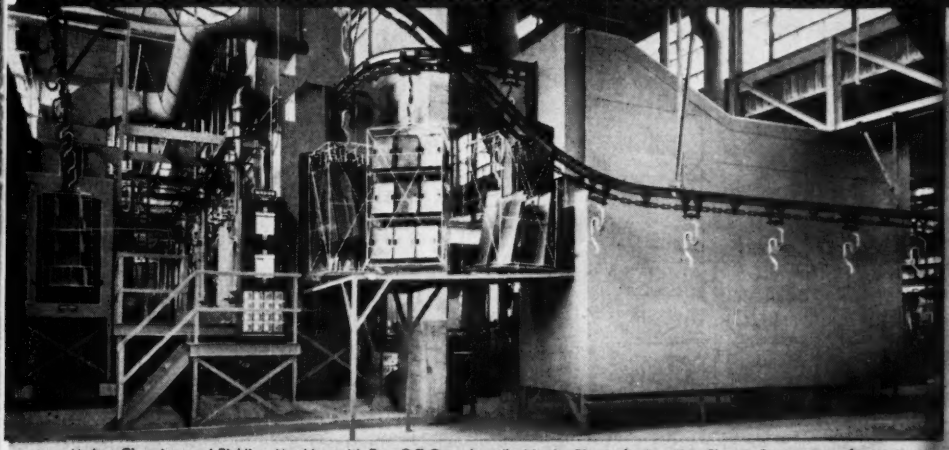

Mahon Cleaning and Pickling Machine with Dry-Off Oven Installed in the Plant of a Leading Electric Range Manufacturer.

CLEANING and PICKLING OPERATIONS Made Simple by Completely Enclosed Continuous Processing Equipment!

New, modern Mahon Cleaning and Pickling Machines have reduced pickling operations to one-third the time formerly required . . . volume of processing solutions has also been drastically reduced. Elaborate ventilating and air replacement systems are no longer necessary with these completely enclosed tunnel-type processing machines. A patented Hydro-Hermetic Seal, running the full length of the machines, prevents the escape of active chemical fumes and permits the use of an overhead monorail conveyor. Manufacturers who are now using these machines in production are loud in their praise of their time-saving effectiveness. Mahon Cleaning and Pickling Machines can be fitted right into your present production system . . . they can be designed to meet any requirement of product processing, production rate, or plant layout. No matter what your finishing equipment requirements may be, you can turn to Mahon with complete confidence . . . remember that Mahon engineers are backed by a wealth of technical knowledge and practical know-how accumulated through thirty years of pioneering development in this highly specialized field. See Mahon's Insert in Sweet's Mechanical Industries File for complete information, or write for Catalog A-52.

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AHON

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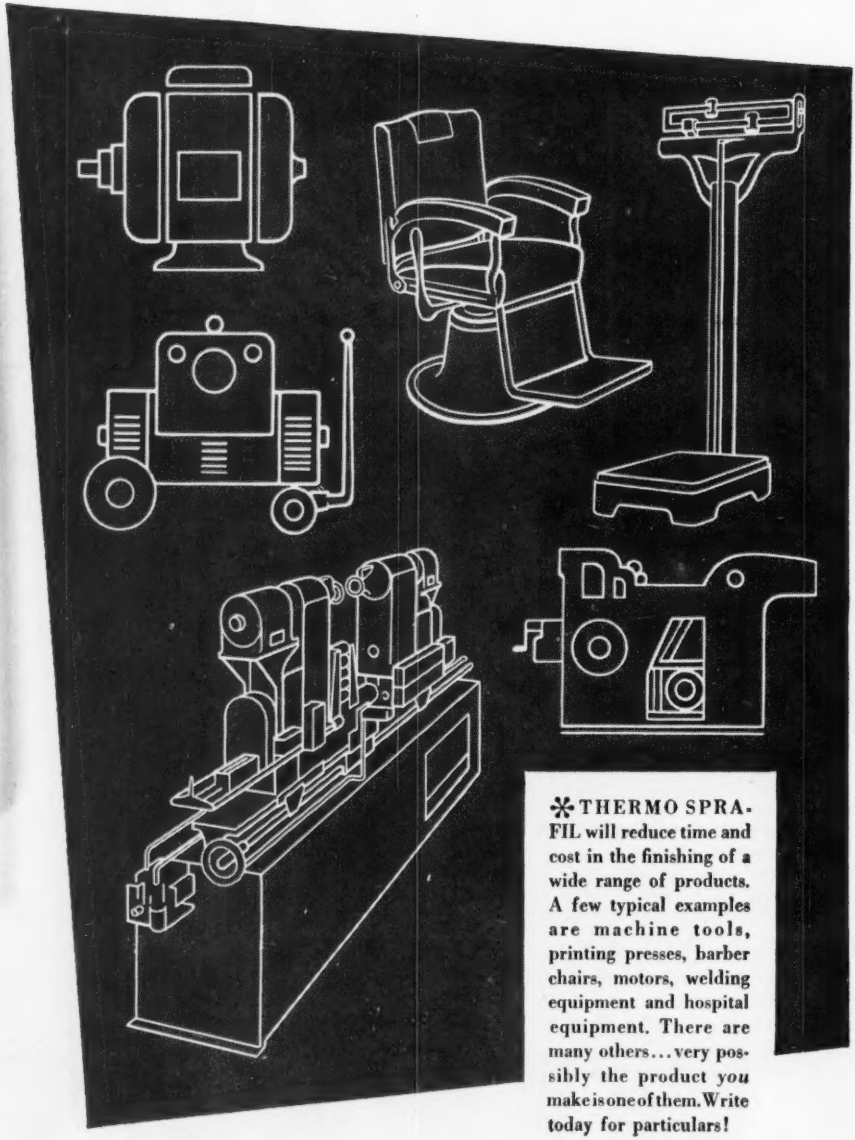
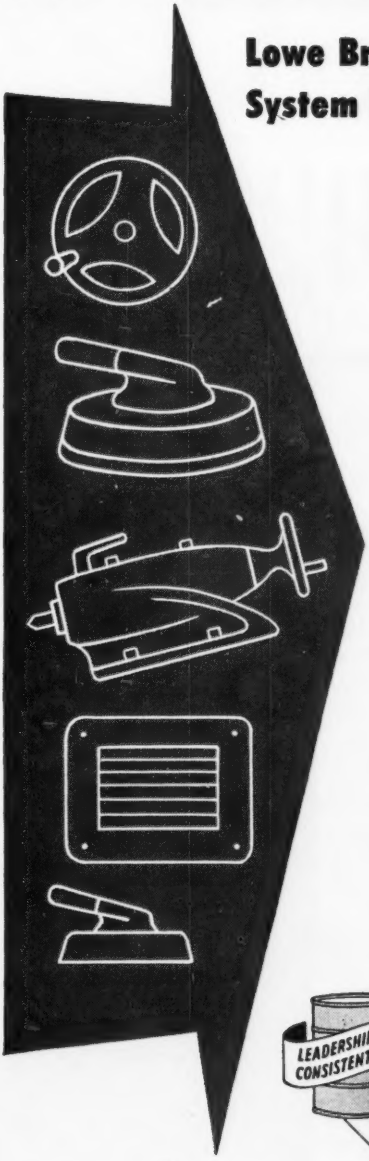


✻THERMO SPRA-FIL will reduce time and cost in the finishing of a wide range of products. A few typical examples are machine tools, printing presses, barber chairs, motors, welding equipment and hospital equipment. There are many others... very possibly the product *you* make is one of them. Write today for particulars!

30% Off Finishing Time!

Lowe Brothers THERMO SPRAFIL System breaks finishing bottlenecks!



THERMO SPRAFIL is a new finishing system incorporating revolutionary new products . . . developed, tested and thoroughly proved by Lowe Brothers "Finishing Specialists." The THERMO SPRAFIL process *minimizes* costly sanding operations on castings and other surfaces* such as angle iron and rough cold roll steel . . . in many cases *eliminates need for sanding entirely!* In exhaustive field tests, THERMO SPRAFIL cut an average of *30%* off normal finishing time!

Here are a few of the THERMO SPRAFIL features that effect big savings and assure finer finishing results:

- Flows out smoothly!
- Fast drying—can be sanded or re-coated in a few hours!
- Dries smooth, free from "pin holing!"
- Eliminates sanding of wheels, levers and similar small castings—greatly reduces sanding time where sanding is essential—sands easily!

THERMO SPRAFIL is one more result of Lowe Brothers' ever continuing search for better finishing methods and materials. Get full information on the THERMO SPRAFIL system now. It may mean significant savings in money and time for *your* finishing operation.

THE LOWE BROTHERS COMPANY • INDUSTRIAL DIVISION • DAYTON 2, OHIO

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Lowe Brothers
FINISHES FOR INDUSTRY

Spotlighting FINISHING Progress

Recent Developments in Plating Methods and Equipment

TECHNOLOGICAL advances and the use of automatic plating machines are two factors that have contributed to increased production of better quality plated finishes, Dr. R. B. Saltonstall, Technical Director, Udylite Corporation, and John V. Davis, Udylite Chief Engineer, told a recent joint meeting of the Niagara Falls Section of the Electrochemical Society with the Buffalo Branch, American Electroplaters' Society. Mechanical equipment, improvement in plating technique and testing methods, as well as cooperation between the plating department and the designers have all contributed to this accomplishment. In discussing recent trends in plating, Dr. Saltonstall pointed out that principal emphasis has been in two directions—reduced costs and improved quality. It is now recognized that modern plating equipment is essential to secure the desired uniformity of product, quality of finish, and efficiency and economy of operation which is the aim of all progressive manufacturers. Mr. Davis brought out specific advantages of the various types of automatic plating machines as his part of the discussion before the joint meeting of electrochemists and platers.

Important advances in plating technology, according to Dr. Saltonstall, have been related to increased rate of metal deposition and the production of fully bright deposits direct from

How one Pittsburgh Brush*

POLISHES 10,000 HEATING UNITS

** An actual case history from The Edwin L. Wiegand Company, producers of CHROMALOX Heating Units.*

WHEN this company needed a way to take the ragged edges off heating units economically and ***fast***, they turned to rough, tough Pittsburgh Brushes for the answer. The 6″ Pittsburgh steel wire brushes like that shown above polish 10,000 heating units during their life.

LET PITTSBURGH ENGINEERS solve your brush problems. Pittsburgh's complete line of brushes of every type, for every purpose, will provide a practical, economical solution of any brush problem you might have. Drop us a line on your company letterhead for a copy of our new booklet that shows, through actual case histories, how Pittsburgh can help cut your brushing operation costs.

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PITTSBURGH *Power Driven* **BRUSHES**

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the bath. Increased attention is being given to physical properties of the deposit. In this connection, Dr. Saltonstall referred to the work being conducted by Dr. Abner Brenner at the National Bureau of Standards on the physical properties of electrodeposited metals under A.E.S. Research Project No. 9. New instruments have been developed for measuring stress-strain relationships in electroplated metals.

In one such device, developed in the Bureau of Standards' work and known as the spiral contractometer, a flat strip is wound to form a helix and is plated on one side only. The stress in the deposit causes the helix to wind more tightly or to unwind depending on whether the stress is compressive or tensile. The change in the radius of curvature of the helix, which is a measure of the stress in the plate, is actually determined by the angular displacement of one end of the helix while the other end is held rigid. This instrument was described in a paper before the 35th Annual Convention of the American Electroplaters' Society by Dr. Brenner and Dr. Senderoff.

Dr. Saltonstall also referred to work carried out by W. M. Phillips and F. L. Clifton, General Motors Research Laboratories, on stress and ductility measurements, and the use of other physical properties in judging the quality of plated parts. At the above mentioned convention, Phillips and Clifton presented data to show that the most desirable nickel deposit for corrosion resistance should have low stress and high tensile strength in addition to sufficient thickness and brilliance.

One point brought out by Dr. Saltonstall was that it is difficult to appraise the quality of the final finish on plated parts, from the appearance standpoint, by other than personal inspection. Methods for measurement of brightness are important, but other factors must be considered. The finish on the

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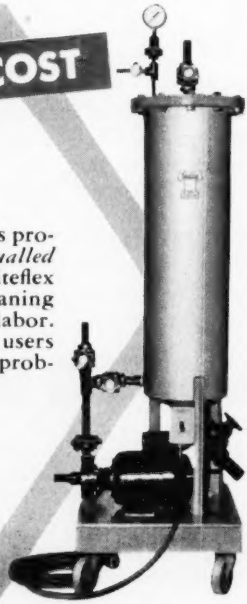

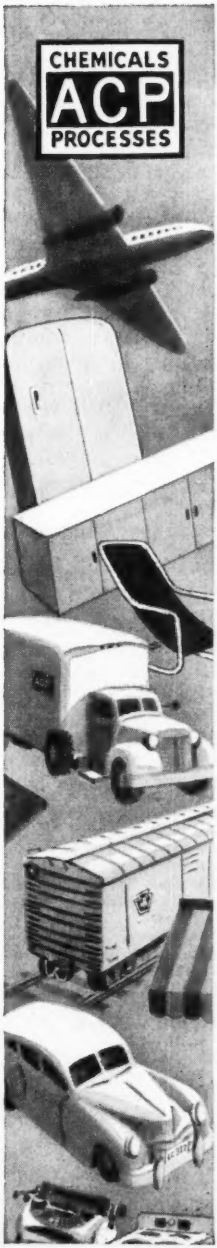

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base metal is another important factor in determining the quality of the final finish. For some types of production, the trend is toward polishing steel before the part is formed. There have also been advances in bulk finishing by precision mechanical tumbling operations. Die castings are being finished using tumbling prior to copper-nickel-chromium plating where the only hand work required is for flash removal.

Dr. Saltonstall predicted that there will be still further progress in increasing the rate of deposition that can be used in regular production line operations. Certain other recent developments were reviewed. One was the use of chromium plate on stainless steel to assist in matching the conventional bright nickel-chromium finish. Also, it was stated that plated tin-zinc alloys are being considered as a possible substitute for scarce cadmium because of the corrosion characteristics and solderability of this alloy deposit. The details of technical work carried out in England to develop tin-zinc alloy plating were described in *"Spotlighting Finishing Progress,"* April 1949 issue of PRODUCTS FINISHING.

In discussing the part equipment has played in plating developments, Mr. Davis stated that automatic machines, typical of the job shop machine shown in Fig. 1, have increased production and lowered costs. The heavy influx of automatic plating machines into World War II industries definitely proved their value for "precision plating" and for providing duplicate results consistently without costly rejects. Such methods will likewise help to meet the requirements of precision plating in the high production era now faced by many industries.

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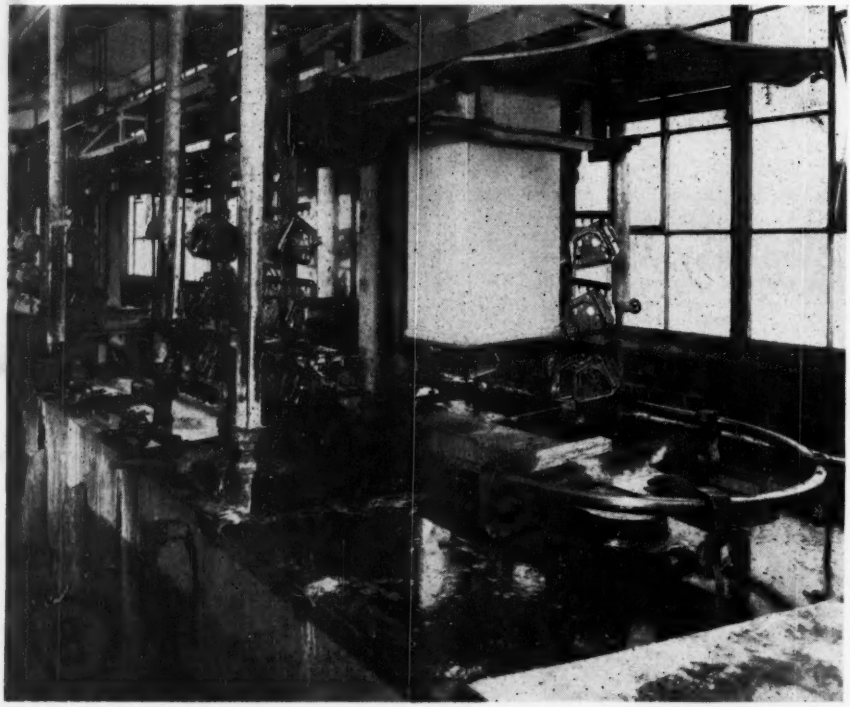
their ability to carry a number of different types of parts through a predetermined cycle of treatments, reduce the cost per unit by eliminating individual handling through the various treatments. However, it was emphasized by Davis that many other money saving features may be just as important but not as easily observed or measured and the time and money saved not as apparent to a prospective user of these machines.

Advantages of Automatic Plating

The full automatic method increases production by virtue of the fact that the flow of work is constant throughout the productive period. This makes possible a more accurate planning of daily output, with assurance of fulfillment of the schedule. It provides a constant flow of work and needs only the necessary number of attendants required to rack the parts and hang them on the conveyor carriers at the loading station.

The size of the tanks in a full automatic plating machine may be determined by the requirements of the job rather than by the length of a man's arm; the tanks may be deeper, anode centers may be either wider or narrower, and no space is wasted with terminals or bus bars. Also, there are no limitations on racks based on the amount of weight an operator can lift

Fig. 1—Automatic plating machines typical of this Udylite full automatic, in use in a Detroit job shop, have increased production and lowered costs in many different types of plating operations. *(Photo courtesy The Udylite Corp., Detroit 11, Mich.)*



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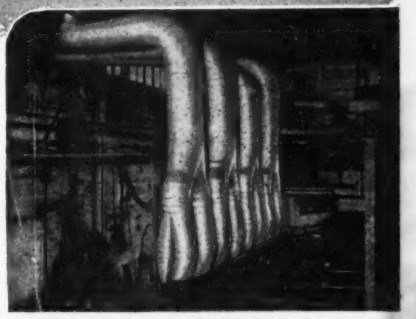
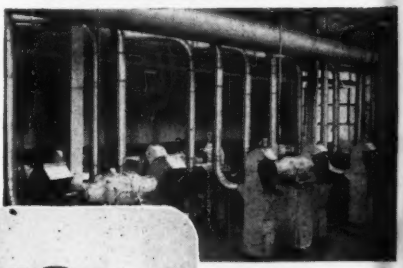


Fumes Removal Installation in Plating Room



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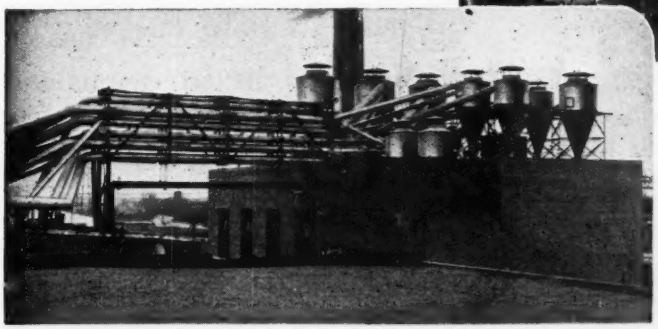

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with his arm outstretched as is the case in manual operations. The rack may be built with heavier copper and insulation where needed and this can result in longer rack life. In hand operations, it may be necessary to space the anodes wider than desirable in order for the operator to remove the parts without danger of striking the anodes; this may result in a wider tank than the work requires and wasted floor space. The space occupied by aisles between rows of tanks in hand operations may require as much space as the tanks themselves, whereas an automatic plating machine occupies only the space required by the tanks.

Automatic equipment shows advantages in reducing dragout and minimizing the possibility of contamination of the plating baths. The amount of dragout can be reduced by lifting the racks from the solution at a rate that permits the surface of the solution to strip the droplets from the parts as they emerge. After adjustment to the ideal rate, the full automatic will maintain it constant day after day, and can effect an important saving in dragout loss over hand operations where the rate of work removal will vary. The possibility of contamination can be minimized by removing less solution as dragout and the amount of rinse water required can be reduced in quite a number of cases.

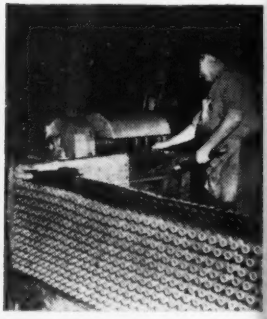
Automatic equipment can show a saving in overall factory cost by reducing the rejects and lowering the down time required to trace the source of trouble and correct it. Thus, the machine cannot skip a rinse or leave a rack in the acid dip too long. The cost of refinishing rejected work, due to more or less irregular individual handling in the hand-operated process, is saved. Those responsible for plating should keep in mind that when a part is received to be plated it may have considerable labor and equipment already invested in it, so any reject after plating may involve a great deal more than the cost of the plating process. All these points should be included when the savings possible with automatic plating are finally cal-

TABLE I

SAVINGS IN FULL AUTOMATIC COMPARED TO HAND OPERATION

1. Floor space—less
2. Tank size—can be deeper
3. Rack size—can be larger, heavier
4. Dragout—less, easier to control
5. Contamination—easier to avoid
6. Rack life—insulation, contacts easier to maintain
7. Ventilation—smaller ducts cover more of tank
8. Installation cost
9. Process control—easier
10. Production control—better planning and scheduling of work
11. Solution maintenance—simpler
12. Uniformity—improved, specifications easier to meet consistently
13. Rejects reduced—less loss of labor and material spent on job before plating
14. Accessories—fewer rubber gloves, aprons, boots required
15. Lost time—less; hot, humid or cold weather have much smaller effect on production

THE FIGHTING MACHINE. Tanks of this type are equipped with track pins of the type shown at the left.



THE BRUSHING MACHINE. Molded track pins are fed in one at a time. An Osborn Disc-Center Wire Wheel Brush meshes with each of six sections where flash and film are to be removed. Areas are cleaned thoroughly in a few seconds and pin is discharged.

What plays clean-up on the rubber-steel team?

...a brush! These are track pins of army tanks. Here, rubber "tires" are bonded to steel pins to produce strong, quiet-operating parts for the rigors of tank warfare.

The problem was to remove the rubber flash and film from six bearing and electrical-ground sections of the pin after molding. With the help of the **O**sborn **B**rushing **A**nalyst, a machine with six Osborn Disc-Center* Wire Brushes was devised to remove the excess rubber from all six areas simultaneously . . . in a matter of seconds.

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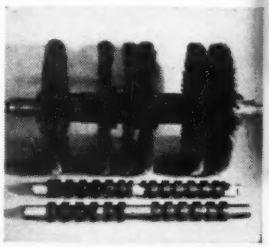

THE BRUSH SET-UP. This photo shows construction of arbor with six Osborn Brushes spaced to fit into track pin grooves where rubber is to be removed. In the foreground are track pins before and after brushing.

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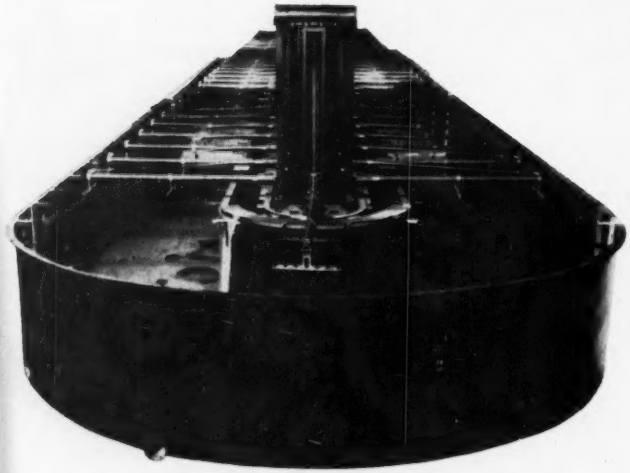

Fig. 2—Large elevator-type full automatic plating conveyor constructed by Hanson-Van Winkle-Munning Company with plating tank rubber lined by Raybestos-Manhattan, Inc. This equipment is used for applications requiring wide anode rod centers.
(Photo courtesy Hanson-Van Winkle-Munning Co., Matawan, N. J.)

culated. A check-off list of possible savings with automatic equipment is given in Table I.

Types of Automatic Equipment

A successful plating machine must be flexible, rugged in construction to ensure uninterrupted schedules, and of a design to permit a wide range of modification for handling all classes of products through any treatment sequence required in modern plating technique. Properly designed and built, set up in a suitable line, with or without corollary equipment such as semi-automatic or hand-operated plating tanks, the full automatic plating machine may handle work which is varied in size and shape; it may even be quickly and inexpensively converted from one type of work to another.

One type of Hanson-Van Winkle-Munning machine is known as the elevator type and is designed to handle massive parts and abnormally heavy loads within low head room. The work is supported by a horizontal arm which is raised and lowered in a vertical plane. The arm remains horizontal and at right angles to the line of travel at all times. Racks, shallow trays, baskets, or barrels carrying the work are attached to these arms. Figure 2 shows a large plating tank, rubber lined by Raybestos-Manhattan, Inc., for use with a full automatic plating machine constructed by Hanson-Van Winkle-Munning for applications requiring wide anode rod centers.

In discussing the different types of automatic plating machines, Davis stated that the path the work follows in traveling through the automatic machine may be used to classify the three general types built by more than one company for the plating industry. These are: (1) the straight line type; (2) the return type; (3) the rotary. These three types are compared on the basis of principal features of the machines in Table II.

The Straight Line Machine

This type machine is generally considered a heavy duty machine, since it can be designed for very large racks and heavy loads. In operation the plating rack may be loaded on the work carriers at one end of the machine and carried through the various tanks in the cleaning, rinsing, pickling, plating, rinsing and drying operations and unloaded at the opposite end of the ma-

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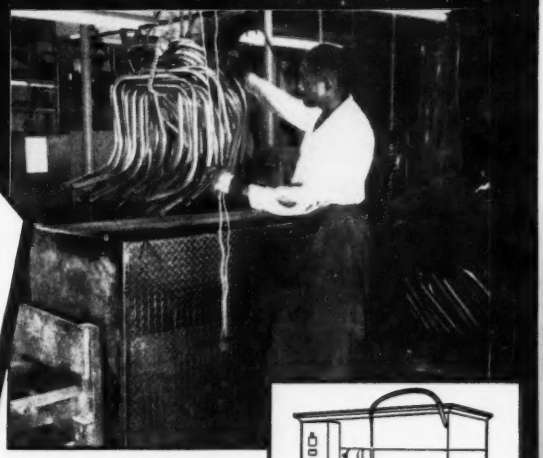

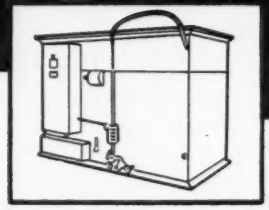

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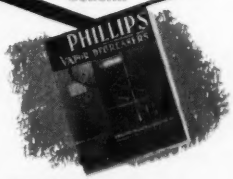

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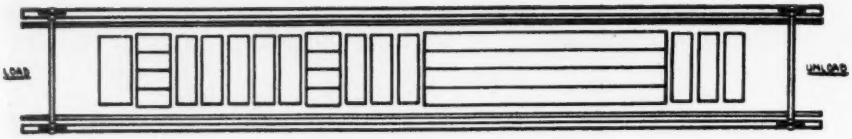

Fig. 3—Plan view of a Meaker Straight-A-Way machine arranged for 15 treatments and 4 rows of racks.

(Illustration courtesy The Meaker Co., Chicago 50, Ill.)

chine. The tanks may be placed very close together; most of the mechanism may be either above or alongside the row of tanks and the whole installation forms a very compact unit that is easy to service and maintain. All other factors being equal, the straight line type of machine requires the least floor space and the most head room; however, if the ceilings are low and head room is not available, the design may be altered to send the work carriers back alongside and in such a case may then require more floor space than either the return type or rotary plating machine.

Several rows of racks may be run through this type of plating machine with three or four racks side by side on each carrier. However, the wide tanks may be difficult to ventilate. The straight line machine is particularly advantageous in plating large and bulky parts where a high rate of production must be maintained.

Figure 3 presents a plan view of a Meaker Straight-A-Way Machine arranged for fifteen treatments and four rows of racks. This type machine can be used whether 1,000 or 10,000 amperes are required for each of the racks. One of the largest installations of plating equipment of this type is in an automotive plant. It consists of three Meaker full automatic machines for copper-nickel-chromium plating of bumper bars and guards. These machines have a combined overall length of 660 feet, use 285,000 amperes of current and over 140,000 gallons of plating solution. These units handle racks

to page 66→

TABLE II

PRINCIPAL FEATURES OF THREE TYPES OF AUTOMATIC PLATING MACHINES

	STRAIGHT LINE	RETURN TYPE	ROTARY
Floor space	Very good	Good	Poor
Rack size	Large	Medium	Very large
Rack weight (loaded)	Heavy	Medium	Very heavy
Installation cost and time	Greatest	Low	Low
Maintenance cost	Low	Low	Very low
Head room	Very high	Low	High
Machine accessibility	Very good	Fair	Good
Anode accessibility	Fair	Good	Good
Load and unload points	Separate	Same	Same
Rows of racks	1 - 2 - 3 - 4	1 - 2	1 - 2 - 3 - 4
Ventilation	Fair	Good	Very good

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New Process Adopted for Production of Navy Aircraft at El Segundo, Calif.

Douglas Aircraft Company (El Segundo Div.) has adopted hot-spray lacquer for finishing of many metal parts, including aluminum, at El Segundo. Use is growing steadily, because of savings such as these:

Time-saving equivalent to 27½ hours in finishing AD-4 airplanes.

Booth time cut from 27½ hours to 18½ hours with present crews and equipment.

Equivalent of 2 gallons of lacquer and 8 gallons of thinner saved per plane.

Hot-spray method, with only one coat, removes hazard of sanding through the first coat of lacquer on rivet heads and skin laps.

The conclusions which led Douglas to use hot-spray lacquer for Navy production, based on thorough tests, were:

1. Required film thickness can be applied by one hot cross coat where two cold cross coats are necessary.

2. Salt spray and weatherometer tests show the hot sprayed film to be superior.

3. Smoother and glossier appearance.

4. Eliminates sanding between coats.

5. Affords maximum uniform film thickness over rivets and seams, by elimination of scuff sanding, thereby giving better protection in service.

This AD-4, built by Douglas for the Navy, is one of hundreds on which hot-spray lacquer is used to cut out finishing costs and time.

6. Reduces application time 50% with a resultant increase in production.

7. Saves materials by less over-spray and less solvent required.

8. Has better flow-out and decreases tendency to sag, blush or orange peel.

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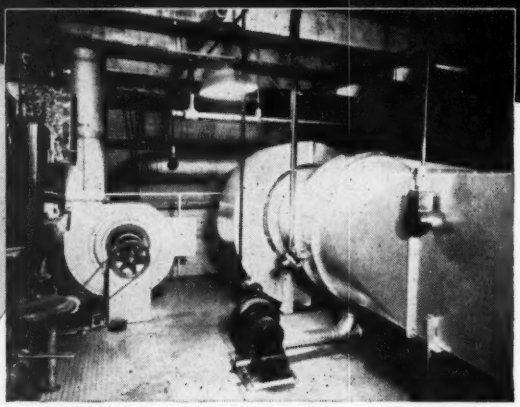
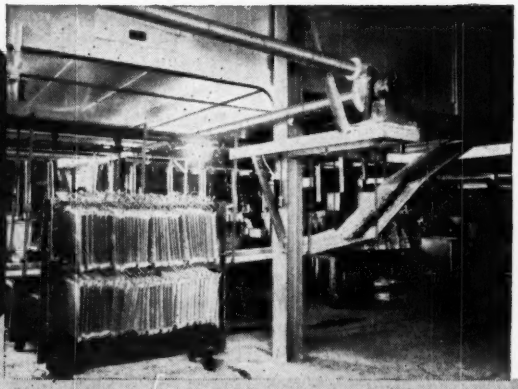


For the installation illustrated below, the heating equipment, control panel and safety equipment shown here are suspended above the floor to save valuable space.

Conveyor type paint baking and dehydrating oven installed in the plant of a large refrigerator manufacturer. This large oven serves a double purpose, baking the finish on the parts and preparing them for dehydration at the same time.



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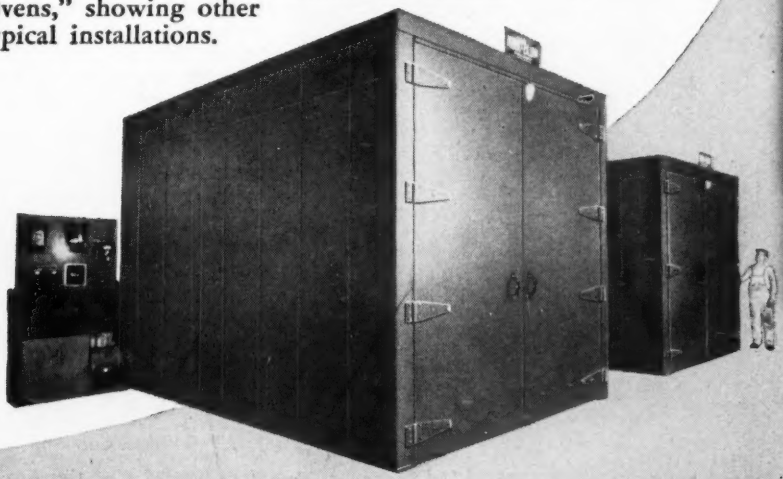

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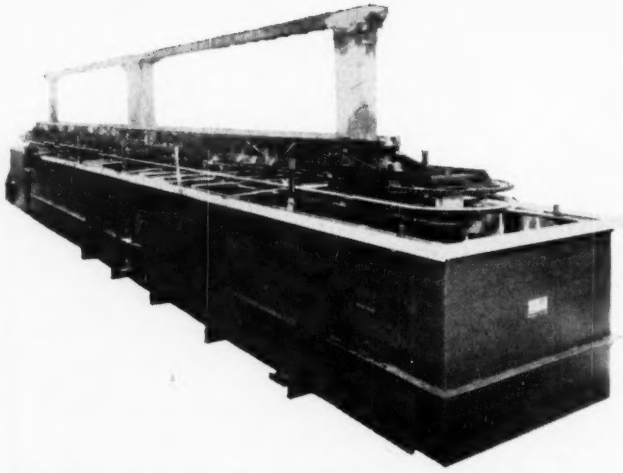

Fig. 5 — Udylite return-type full automatic plating machine as shipped ready for installation. *(Photo courtesy The Udylite Corp., Detroit 11, Mich.)*

90 inches long, 22 inches wide in the direction of travel, and 18 inches across. Over half an acre of surface is plated every eight hours with a bright finish. Figure 4 shows the long rack and parts that can be handled by this type of plating machine. Hanson-Van Winkle-Munning produces a straight line type automatic plating machine which is also particularly suited to very high lifts of long pieces.

The Return Type Machine

Davis classified this type as a medium duty plating machine that is very compact as to floor space requirements. It will accommodate racks of medium size, generally of the order of 12 to 18 x 36 x 6 inches thick; loaded racks will average 35-50 pounds. Due to the fact that some models have mechanisms between rows of tanks, it is not as completely accessible as the straight line machine. However, it has been found to be easy to maintain, and the solutions and anodes are accessible. A principal feature of the single row machine is its economy of operation, in

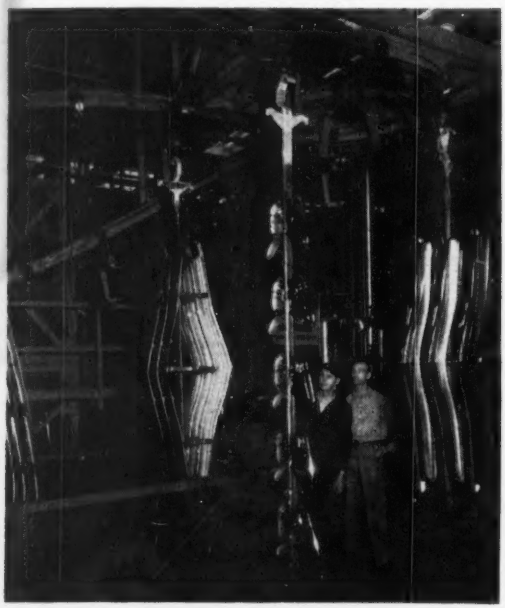

Fig. 4—Long rack carried by trolley conveyor for automatic loading on a Meaker Straight-A-Way plating machine. *(Photo courtesy The Meaker Co., Chicago 50, Ill.)*

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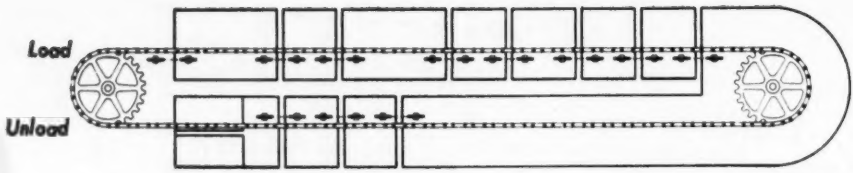

Fig. 6—Typical floor plan of a Meaker return-type full automatic machine where loading and unloading are accomplished at one point.

(Illustration courtesy The Meaker Co., Chicago 60, Ill.)

many cases by one man, and its adaptability to the single conveyor system used in many plants. The single row machine provides easier servicing, maintenance, ventilation, and solution control, since every section of the unit is readily accessible. These machines are built to low or extremely high lifts, as the nature of the parts being processed require. Tanks can be placed close together to shorten the total length and save valuable floor space, as a result of the flexibility permitted in spacing work. Figure 5 shows a Udylite Return Type full automatic plating machine ready for installation.

The chief advantage of the double row automatic plating machine is doubled production without a proportionate increase in floor space occupied. While these machines have the same general features of the single row type, they are especially adaptable to plant locations where length must be kept to a minimum. The necessary extra length of the carrier rail turns, however, makes it necessary that these machines be built to greater width to accommodate the two rows of carriers. Another advantage is that carriers can be spaced at different increments along the two rails. Thus, two separate plating jobs can be done on one machine, with the two rows of tanks containing the required work solutions. Work carriers can also be staggered on the turns to give more working space.

Figure 6 shows typical floor plan of a Meaker return type full automatic machine where loading and unloading are accomplished at one point. The racks are lifted out of one tank, carried over, and set down into the next where they are carried along by the pusher attachment of the main conveyor. The transfer can be slow for draining, wide for bulky racks, high for long racks—wide or narrow, slow or fast.

For handling small parts in bulk, there may be advantages in using an automatic barrel plating machine. Figure 7 shows a full automatic return type small parts plating machine produced by Frederic B. Stevens, Inc. This machine provides a complete processing cycle of cleaning, acid dip, strike, plating, rinsing, bright dip, and drying in one unit. As it is a return type machine, the processed work is loaded and returned to practically the same point, permitting one operator to load the plating basket and also to move the filled containers or boxes away from the automatic unloading hopper. When the plating basket moves into the vertical position at the load and unload machine end, the operator loads the basket either manually or by an automatic loading device. The plating basket progresses through the various processing tanks to the unloading point, where the plated parts are automatically unloaded into a hopper or a suitable container. There is only one manual operation involved, namely, loading the machine. All parts remain in the same plating basket during the complete processing cycle.

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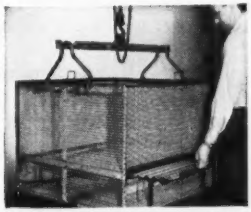

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The Munning type machine, manufactured by Hanson-Van Winkle-Munning Company, is of the return type, loading and unloading at the same station. It performs continuously and automatically all the operations in the plating cycle, such as cleaning, rinsing, plating and drying. This type of machine features: (1) continuous movement of work in all treatments; (2) rapid transfer from one tank to another; (3) selected treatment times, varied for each individual treatment tank; (4) high speed horizontal agitation in the plating baths. This type of machine is used for plating copper, nickel, chromium, brass, zinc, cadmium, gold and silver.

The Rotary Type

This is a large capacity machine generally used where the rate of production is not the major factor, and where parts to be plated are large and cumbersome. One established use is in finishing of airplane propellor blades. The arrangement of tanks around the machine is similar to a cart wheel. The tanks may be arranged around the center of the machine radially like the spokes in a wheel, or end to end like the rim of a wheel. In either case, a certain amount of space is lost either between the sides of the tanks or between the tanks and the center of the machine. Either arrangement permits easy access to the tanks to install ventilation for the tanks, and to service the solution, replace anodes, and so on. Another significant feature is that the machine has very few moving parts, and thus requires very little maintenance. The rotary type generally requires more head room and floor space than other types.

Small Full Automatic Machines

Smaller, fully automatic plating machines are also available which have advantages for certain production operations. These machines have been found particularly useful for cadmium and zinc plating, as well as for other metals. One machine manufactured by

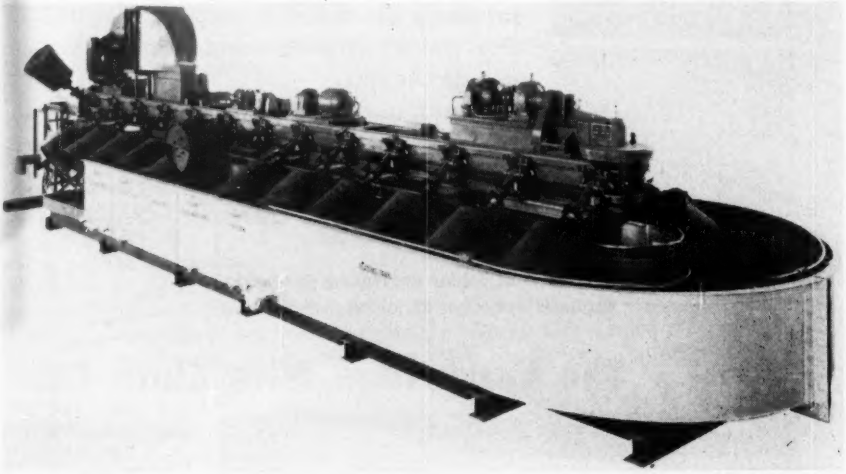
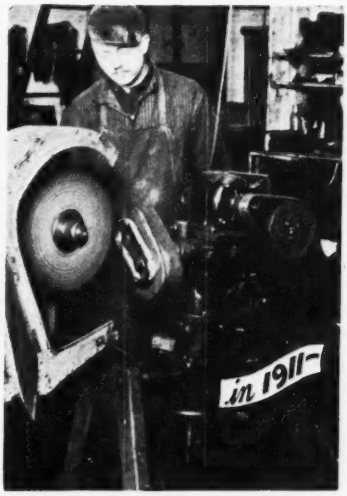


Fig. 7—Stevens "Standard" return-type full automatic small parts plating machine. This machine provides a complete processing cycle for handling small parts in bulk.
(Photo courtesy Frederic B. Stevens, Inc., Detroit 16, Mich.)

ACME Automatic Polishing and Buffing Machines



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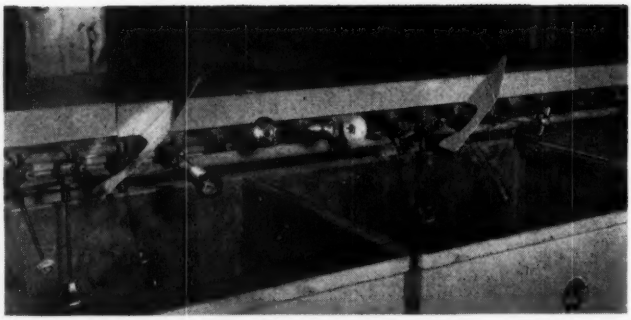

Fig. 9 — In the Daw Junior Type full automatic plating conveyor parts of reasonable shape or size are individually handled on wire fingers. Work transfers from tank to tank and is automatically lifted to slightly above horizontal position to prevent carry-over of solution.

(Photo courtesy Lasalco, Inc., St. Louis 4, Mo.)

the Udylite Corporation is known as the Junior Full Automatic. This machine is said to be completely automatic having nine stations to perform the following sequence of operations: electroclean, cold rinse, acid dip, cold rinse, plate, cold rinse, hot rinse, dry, load and unload. Every phase of the cycle is adjustable which provides uniformity in the plated products. These smaller machines offer all the advantages of the larger units within their limits of capacity and current consumption. Machines of this type may be trucked to different jobs in interplant work and can be spotted easily. The tank itself forms the base of the machine which is a compact unit having all the essentials to do a complete plating job.

Figure 8 shows a circular chromium plating machine recently developed by Lasalco, Inc. Some features of the machine are: (1) minimum labor requirements, using only one operator to load; (2) completely automatic unloading; (3) no racks or rack maintenance necessary; (4) more uniform plating with fewer rejects. The machine as supplied is complete, ready to install. Only exhaust and electrical connections are needed. Concerning output, data from Lasalco state that 4287 pieces may be processed per hour at a 16-second plating period; 2139 pieces at 32 seconds; or 1173 pieces at 55 seconds. Lasalco also manufactures a completely automatic conveyor known as the "Daw Jr." It features a continuously moving cathode which eliminates entirely all interruptions in work movement; also, as shown in Fig.

Fig. 8—A circular chrome plating machine built by Lasalco, Inc.; this machine was designed for flash chromium plating of small parts. It is a one-tank unit, complete with exhaust cover as shown.

(Photo courtesy Lasalco, Inc., St. Louis 4, Mo.)

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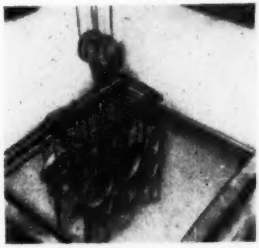

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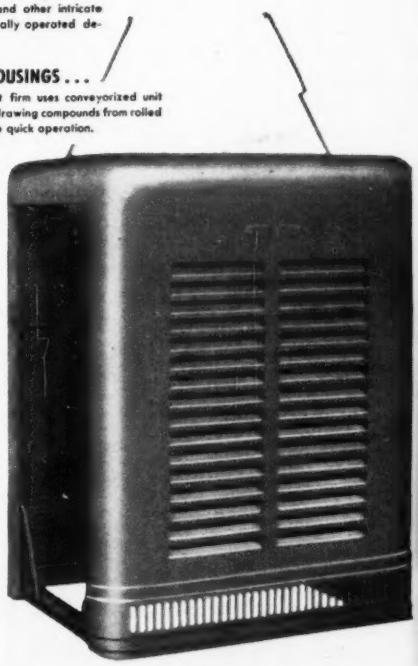

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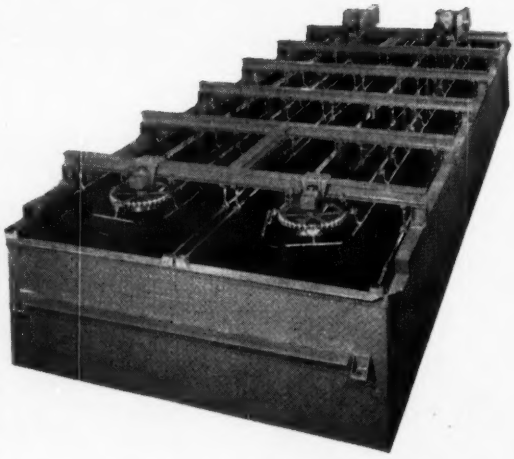

Fig. 10—This Meaker semi-automatic twin plating machine was built for an application where the floor space did not permit a longer unit or two individual units. *(Photo courtesy The Meaker Co., Chicago 50, Ill.)*

9, all parts of any reasonable shape or size are individually handled on wire fingers, eliminating racks and rack maintenance. Lasalco, Inc. claims that this machine has particular advantages for zinc plating of small millimeter size cartridge cases in the vertical position.

Semi-Automatic Equipment

Semi-automatic units are frequently employed as part of a full automatic routine—the cleaning, rinsing, and preplating being carried out on the full automatic plating machine, while the plating is performed in a conveniently located semi-automatic machine. The racks are again hung on the full automatic for rinsing and drying, or for further processing. Manufacturers with a moderate daily output, where the nature of the product varies in composition, such as steel, brass, or die castings, requiring different processes of cleaning and surface perparation, have found this combination particularly useful.

The semi-automatic machine assures a uniform coating, since the time cycle for plating can be mechanically set; generally the parts to be plated travel down one side and return to the operator along the other side. Every rack of parts is exposed to the same plating conditions for exactly the same preset time. Compared with hand tanks the semi-automatic unit generally requires much less floor space, and enables an operator to turn out two to four times as much plated work, continually, with a predetermined coating thickness.

One important feature of the full automatic return type plating machine is its adaptability for work in conjunc-

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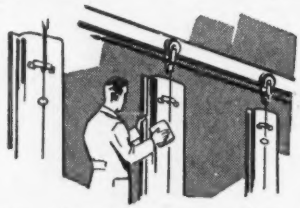

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tion with semi-automatic plating machines. The Hanson-Van Winkle-Munning Company has cited an example where a semi-automatic nickel conveyor is advantageous in combination with a full automatic cleaning, rinsing, copper plating, and drying conveyor. The unloading station on the full automatic precedes final rinsing and drying. In this case the full automatic conveyor operates independently of the semi-automatic plater to clean, rinse, and dry work prior to spray paint, and to copper plate work that does not require a nickel deposit. Figure 10 shows a Meaker semi-automatic twin plating machine.

* * *

Factors Affecting Antifouling Paints

IN recent years the mechanisms by which successful antifouling paints function have become more clearly understood. Work conducted at the Naval Research Laboratory by A. L. Alexander, R. I. Benemelis, and S. B. Crecelius and reported at the 116th Meeting of the American Chemical Society has shown that tall oil may replace up to 50 per cent of the rosin present in a soluble-matrix type antifouling paint without affecting seriously the antifouling efficiency or physical stability of the film. Several theories relating to the method by which antifouling paints function have been proposed. One of the most popular relates to matrix solubility. This theory has demonstrated that in the design of soluble-matrix paints in which the rate of toxic release is controlled by matrix solubility, rosin can play an important role since it possesses an optimum solubility in sea water.

Objectionable properties of rosin, such as brittleness and poor water re-

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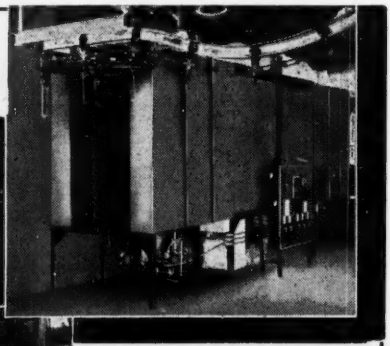

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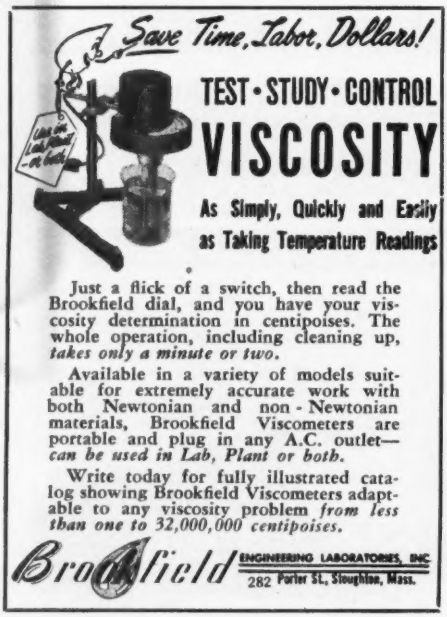
sistance, require considerable modification before paints of practical durability may be prepared employing rosin as a major matrix ingredient. The experimenters pointed out that since rosin is used extensively as the principal constituent of the matrices of both hot and cold plastic paints, the advent of tall oil in sufficient commercial quantities for such application appeared interesting as a possible substitute or diluent for rosin in the formation of soluble-matrix coatings.

A comparison of the fouling resistance of rosin tall oil vehicle antifouling paints, containing oxide or copper as pigments, showed that the copper pigment containing essentially 85 per cent copper and 15 per cent cuprous oxide was not quite equal to cuprous oxide as an antifouling pigment. With tall oil alone inferior performance was indicated when its percentage exceeded 70. Below this figure paint prepared from tall oil rosin mixtures performed as efficiently as those containing normal amounts of rosin.

In addition tall oil esters of glycerol and pentaerythritol were prepared and studied along with abietic acid and hydrogenated methyl abietate as rosin diluents. The esters were found to affect the antifouling efficiency and physical durability adversely in direct ratio to the extent to which they were substituted. In formulations in which rosin was diluted with abietic acid and hydrogenated methyl abietate and even with an unesterified tall oil, performances approximately equal to rosin were obtained. It was pointed out that the data on both physical properties and antifouling efficiency were somewhat more consistent with abietic acid and hydrogenated methyl abietate than for the tall oil blends. For the exposure period of 10 months, the hydrogenated methyl abietate and abietic acid did not appreciably alter the performance of a rosin matrix regardless of the ratio of rosin to diluent.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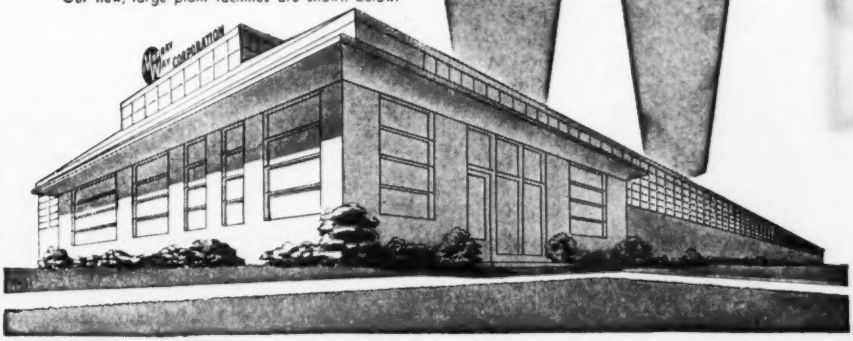

TABLE III

COMPARATIVE RATING BASED ON AVERAGE WEIGHT LOSSES OVER TOTAL TEST PERIOD

Metal	Average Weight Loss in Grams	Quality Factor
Monel Metal	61.2	100
Extruded Aluminum Bronze	137.5	45
Rolled Aluminum Bronze	148.2	41
Chromium-Nickel-Iron Alloy	237.3	26

annealing. The sulfuric acid content of the pickle was from 5 to 7 per cent by weight and was kept up to strength by additions of fresh acid. The operating temperature was 190 deg. Farenheit.

Materials used in the comparative tests were: (1) Monel metal; (2) rolled aluminum bronze; (3) extruded aluminum bronze; and (4) chromium-nickel-iron alloy. All the specimens were removed for inspection after an initial exposure of 87 days, during which the tanks operated for 457 hours. They were reinstalled and left for a second period of exposure of 244 days, during which the tanks operated for 1991 additional hours. This made a total exposure of 331 days, or 2448 hours' actual pickling time.

Examination of the specimens when removed showed that both types of aluminum bronze rods had acquired thick coats of a tightly adherent, porous, dark brown deposit. The chromium-nickel-iron alloy rods were badly corroded in an irregular manner. Washers of this alloy and also the bronze washers were attacked severely by irregular corrosion which in several cases resulted in perforation. The general appearance of the Monel metal rods and washers was good. They remained smooth and had acquired only a slight brown stain that was removed readily. The condition of the threads on the Monel metal rods was much better than threads on any of the other materials. On all rods those portions of the threaded ends which projected beyond the nuts were found to be corroded appreciably. Only the Monel metal rods showed no significant attack on the threads ahead of the nuts. Weight losses, obtained for the various metals used in the tests are summarized in Table III, which is

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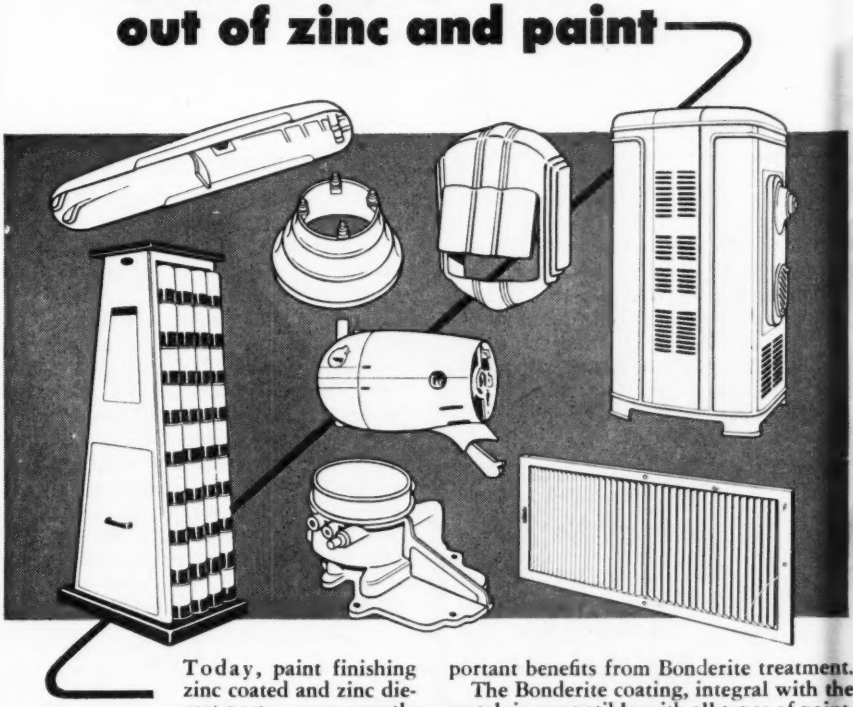

Today, paint finishing zinc coated and zinc die-cast parts—once a costly and difficult problem for manufacturers and users—is simple, sure and speedy when Bonderite is used before painting.

On zinc and zinc alloy diecastings Bonderite stabilizes the reactive nature of zinc, uniformly coating all surfaces, deep recesses and orifices. Zinc coated steel sheets, widely used in industry, get the same important benefits from Bonderite treatment.

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TABLE IV

COMPARATIVE RATING BASED ON AVERAGE LOAD CARRYING ABILITY OF SPECIMENS AFTER TEST

Metal	Average Load Applied Through Nuts on Rods	Quality Factor
Monel Metal	52,800 Lb.	100
Rolled Aluminum Bronze	15,300 "	29
Extruded Aluminum Bronze	14,500 "	27
Chromium-Nickel-Iron Alloy	3,400 "	6

based on the average for four rods of each material.

After weight loss determinations had been made, physical tests were performed on all materials to determine how much strength had been lost by corrosion. Having in mind the way in which tie rods are stressed in service by tightening the nuts, a method of applying loads through the nuts was used in these physical tests. The test results, which are significant in terms of maintaining tight tanks, free from excessive seepage of solutions, are given in Table IV.

Monel has also given satisfactory results when used for pickling tank accessories. Monel baskets and crates have shown long service life. Its strength and retention of this strength under corrosive attack contribute to its value for this use. It is reported that a life of 16 years or more is not unusual for such Monel equipment. Tank heating assemblies, pails, fittings, and pipe lines are made of Monel because it resists erosion by steam and corrosion by pickling acids.

* * *

Resistance and Capacitance Measurements Are Useful in Determining the Corrosion Resistance of Painted Steel

METAL FINISHING technologists are always interested in new methods for evaluating the corrosion resistance of protective coatings. Work conducted by F. Wormwell and D. M. Brasher, and recently reported in the "Journal of the Iron and Steel Institute" (England) has shown that resistance and capacitance measure-

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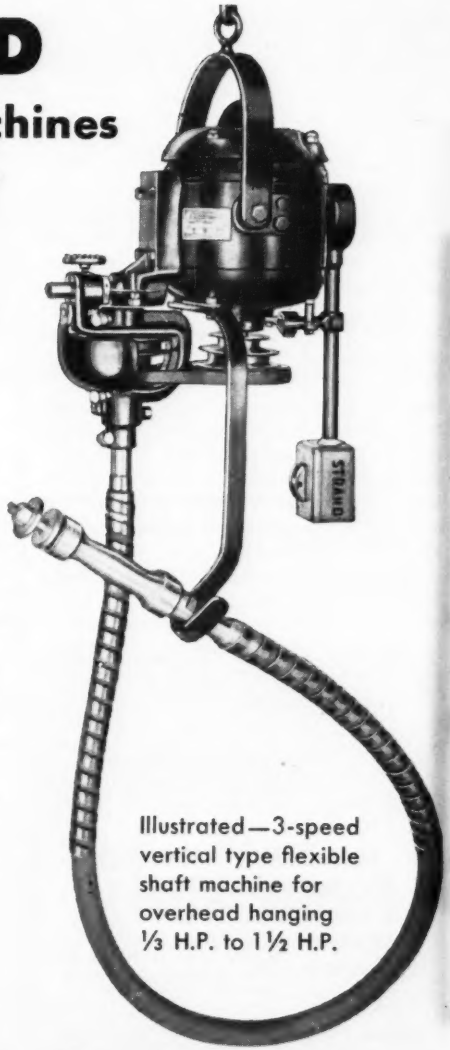

Illustrated—3-speed vertical type flexible shaft machine for overhead hanging ⅓ H.P. to 1½ H.P.

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ments on immersed painted metal panels can give useful information concerning the changes in the paint film and the incidence and progress of corrosion of the underlying metal. Curves plotted showing capacitance vs time, and conductance vs time provide a valuable indication of onset of rusting by a sudden and large increase in steepness of the curve. This indicaton is free from the personal errors associated with visual observation.

The capacitance values were also found to give information about the properties of the paint film, such as thickness and water absorption, during the early stages of immersion. This technique was used to investigate the influence of such factors as type of paint, adverse conditions during painting, and aeration and stirring of the sea water on corrosion resistance provided by the coating.

Specimens of mild steel, 2½ x 3½ x ⅛-inch thick suitably painted were

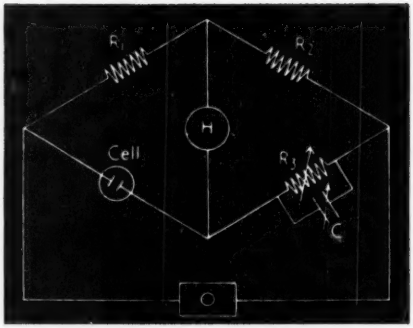

Fig. 11—Bridge-circuit for a.c. measurements used in resistance and capacitance studies of painted steel.
(Illustration courtesy "J. of the Iron and Steel Institute")

used in the study. Two similarly painted plates were supported, 1 inch apart, with the top surfaces 1½ inches below the surface of artificial sea water (vol. 1500 ml.) in a resistance glass 2-liter beaker, the whole comprising a cell of unknown resistance and capacitance. Two or more cells, connected by capillary bridges to an intermediate vessel containing a calomel half-cell, enabled potential measurements to be made on the test specimens.

The cell formed one arm of a bridge network as shown in Fig. 11. Resistances $\mathbf{R}_1$ and $\mathbf{R}_2$ were housed in a ratio box, with provision for adjusting each resistance to values of 10, 100, 1000, or 10,000 ohms. $\mathbf{R}_3$ is a variable resistance box covering the range 0.1 to 10,000 ohms and **C** a variable capacitance box covering the range 0.0001 to 1.0 MF. All resistances used in the tests were of the non-inductively wound type. Alternating current was supplied by an oscillator **O** working on input from 230-V, (single phase mains), 50-cycles/sec. (and giving an output of about 1,000 cycles/sec.) at 2.5 V. The bridge balance was detected by a telephone receiver **H**. Flexible wire leads from the "input" terminals of the bridge were connected by clips

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to the steel rods supporting the appropriate pair of test specimens.

As soon as possible after the immersion of the painted specimens, a balance was obtained on the bridge by alternately adjusting the variable resistance and capacitance. The ratio arms R_1 and R_2 were made equal and of the same order as R_3, unless the resistance of the cell made it necessary to use a 10:1 ratio. In this case, values obtained for the resistance were slightly lower, and those for the capacitance slightly higher than for a 1:1 ratio. In conducting the tests current was passed through the cell for the minimum time necessary to obtain a bridge balance in order to avoid possible changes in the paint films. Studies showed that except in the latter stages of paint failure, when the cell resistance was low no measurable change occurred during the application of the current. Immediately after the resistance and capacitance had been measured, the electrode potential of each specimen was measured with reference to a saturated calomel electrode and the solution temperature was noted. During the course of the experiments, readings were taken at intervals of approximately 1-2, 5, 15, 30, 60 minutes, then hourly for 6 hours and then daily or at 2-day intervals. Tests were continued until considerable paint failure and rusting had occurred.

Figure 12 shows the results of plotting the reciprocal of the resistance (conductance) vs time for one, two and

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Our long and varied experience in the blackening field with our well-known and proven BLACK MAGIC blackening processes, has brought out the fact that there was a need for a one-bath blackening solution which would not only produce an attractive black finish, but that the finish should have more corrosion resistance, operate at a lower temperature to decrease the dragout of solution, blacken heat-treated parts easily, be self-rectifying to inhibit the build-up in the solution of red iron oxide and counteract contaminants such as copper, zinc, etc., which frequently are introduced into the blackening solution; also, that the blackening solution in use should remain in chemical balance and new additions of salt be made by adding the required quantities of one chemically balanced salt. With these characteristics of a blackening bath in mind, the new BLACK MAGIC formula was developed.

★ **Easily blackens heat treated parts.** BLACK MAGIC Type A overcomes the difficulties normally present in applying a black oxide finish to cyanide hardened pieces, which have been oil quenched, and carbo-nitrided parts.

★ **One bath! One salt!** BLACK MAGIC Type A blackening process requires only 1 bath. The same salt mixture that makes up the initial solution is used to replenish dragout losses, thus maintaining at all times a true, chemically balanced BLACK MAGIC solution. Only 6½ lbs. of BLACK MAGIC salts are required to make up each gallon of solution.

★ **Lower operating temperature.** BLACK MAGIC Type A solution is operated at a boiling point of only 290° F. This substantially decreases the amount of dragout and effects important savings in heat consumption. The higher fluidity of the BLACK MAGIC solution lowers operating costs considerably.

★ **Self rectifying.** BLACK MAGIC Type A overcomes the normal tendency in black oxide processes to build up red iron oxide in colloidal form which eventually clings to the processed work. BLACK MAGIC is so formulated to be self rectifying and under normal and many abnormal conditions will keep the bath in excellent operating condition at all times.

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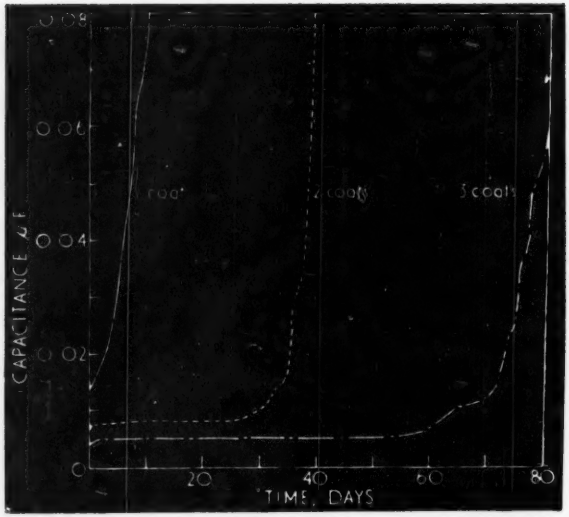
Fig. 13 — Capacitance vs. time curves for one, two, and three coats of paint. Changes are due to initial breakdown of paint. Based on studies reported in the "J. of the Iron and Steel Institute."



three coats of paint, where the conductance is plotted on a relatively open scale. A sharp rise in conductance, which can be clearly seen in the figure below, indicates the initial breakdown of the paint film. The experiments also showed that the initial breakdown of the paint is accompanied by a very large increase in the capacitance of the cell. The capacitance vs time curves corresponding with the conductance vs time curves of Fig. 12 are given in Fig. 13.

The method of following the course of breakdown of the paint by means of capacitance vs time or conductance vs time curves was used to determine the effect of painting under adverse conditions on the corrosion resistance afforded. Figure 14 shows results obtained with 4 pairs of panels painted with two coats of paint under four different conditions as noted thereon. The deterioration was severe under certain of the treatments

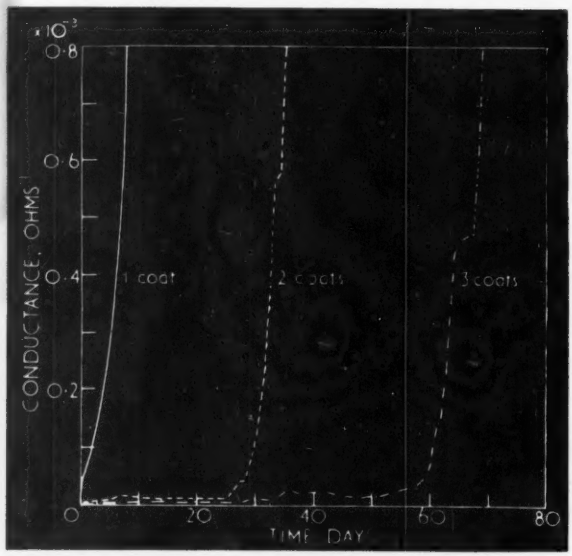


Fig. 12—The results of plotting the reciprocal of the resistance (conductance) vs. time for one, two, and three coats of paint. Changes are due to initial breakdown of paint.

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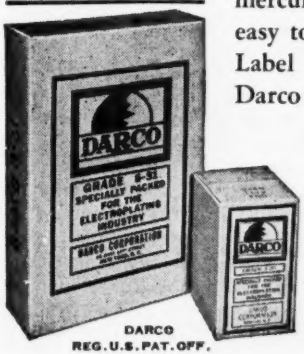

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as shown by the extremely high capacitance values reached. Metal finishing technologists will agree that these results are in line with general practical experience regarding the harmful effects of matter enclosed between the metal surface and the paint.

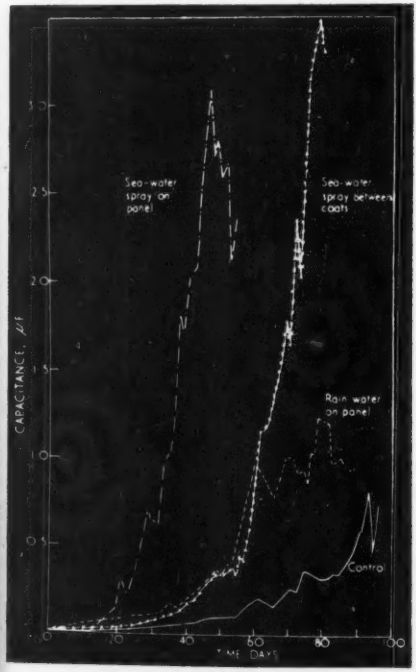

Fig. 14—Capacitance measurements applied to study of the effect of adverse conditions during painting on rate of breakdown of paint.

(Illustration courtesy "J. of the Iron and Steel Institute")

On the whole, the test method showed that there is good correlation between the changes in electrical properties of the painted steel and the deterioration of the paint coating, with subsequent corrosion of the steel. The stage at which the paint fails to protect the metal can be recognized with reasonable ease and certainty by electrical measurements, which are free from the personal errors associated with visual observation.

* * *

Smoothing Metal Surfaces by Electropolishing Avoids Cold Working Effects

IN discussing some of the metallurgical aspects of metal surface treatment before a recent meeting of the Niagara Falls Section of the Electrochemical Society, Dr. Charles L. Faust, Battelle Memorial Institute, brought out data to show that the results and course of surface reactions can be changed because of effects related to the method of smoothing the surface. Yields, initial reactions and rates thereof, side products, structure of electrodeposited metals, frictional properties, and many other "surface reactions" may be influenced. Dr. Faust stated that the non-mechanical methods, chemical and electrochemical, provide unique and advantageous smoothing. This is because of the complete absence of cold-working effects. However, both general types of finishing, mechanical and non-mechanical, are important, and the best selection or combination can be made only when the advantages and limitations of each are considered.

Along this same general line, Dr. Faust presented a paper at the 37th Annual Meeting of the American Electroplaters' Society which showed that the absence of mechanical action in electropolished surfaces has a very practical advantage in engineering plating. Data reported was based on electron diffraction examination of one-minute nickel plates on stainless steel specimens which were prepared by: (1) Abrading surface on 2/0 emery paper; (2) Metallographically polishing; (3) Electropolished so that no basis-metal

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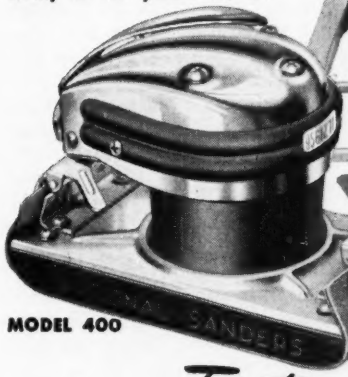

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structure was visible under the microscope; (4) Electropolished so that the basis metal structure was faintly visible under the microscope. In the case of samples 1 and 2 (mechanical preparation) the nickel plate had a fine-grained cubic structure with (100) faces oriented parallel to the surface of the samples. The one-minute nickel plate on the two electropolished surfaces was large grained, having a grain size which was comparable to that of the austenite structure of the basis metal. Elongation of the spots in the electron diffraction patterns was similar to the asterism sometimes observed in X-ray pictures. According to Dr. Faust, in the case of the electropolished surfaces the spot-elongation probably indicates a deformation of the normal nickel lattice to conform with the similar but slightly larger austenite lattice.

Thicker nickel plate (10-min.) on the mechanically polished samples in (1) and (2) showed no change in grain size observable by electron diffraction. On the electropolished samples, the grain size of the thicker, 10-minute, nickel plate was not appreciably smaller, but 15-minute and thicker nickel plates showed diffraction patterns indicating both fine-grained and coarse-grained structures. Nickel plating was done at 150 amp./sq. ft., in a bath at 100 deg. F., containing 55 oz./gal. of nickel sulfate and 6.7 oz./gal. of sulfuric acid, calculated as 100 per cent H_2SO_4. It was reported that the plates were pit-free gray nickel. The obvious conclusion from these studies, as pointed out by Dr. Faust, is that electropolished surfaces contain undistorted grains of normal size on which the nickel plate builds pseudomorphically. The electron diffraction pictures suggest that on an electropolished surface the nickel plate continues the grain structure of some, but not all, of the surface austenite grains.

There have been numerous publications which show that the surface of the basis metal influences the orientation and grain size of the first portion of a plate and the strength of the attachment of the plate. Dr. Faust presented experimental data to show that high strength from a plate-basis metal interface is obtained when the surface to be plated is prepared by electropolishing. The advantages of electropolishing for surface preparation of parts to be chromium plated for engineering uses was also emphasized by Dr .Faust. Where friction is involved, tests have indicated that in some cases an electropolished surface can be superior to a mechanically finished surface in bearing service.

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FLORIDA architects are specifying aluminum for an increasing number of building products such as architectural shapes, window and door frames, screen wire, sheeting, building hardware, and other elements. To fulfill service requirements with regard to corrosion resistance in the most satisfactory manner, many of these products require a protective coating of some kind. Frequently, anodizing by the sulfuric acid process is specified to provide surface protection for exposed aluminum parts.

One Florida plant equipped to fabricate many aluminum architectural elements is the Miami Metal Weatherstrip Company. This organization has installed facilities for anodizing aluminum parts so that aluminum products can be furnished to each customer, finished as he specifies.

Among the items fabricated in this plant are aluminum window frames, screens, and aircraft structural elements. The company has built many of its own fabricating machines, including machines to roll aluminum strip to any desired shape.

Fig. 1—A rack of jalousie window frames is lowered into one anodizing tank. Current controls and timers can be noted in the background.

Anodizing Process

Anodizing is performed in one of two tanks. One tank, 17 feet by 4 feet by 7 feet deep, is made of acid-proof brick. The other, 31 feet by 3 feet by 6 feet deep, is constructed of steel plate, lead

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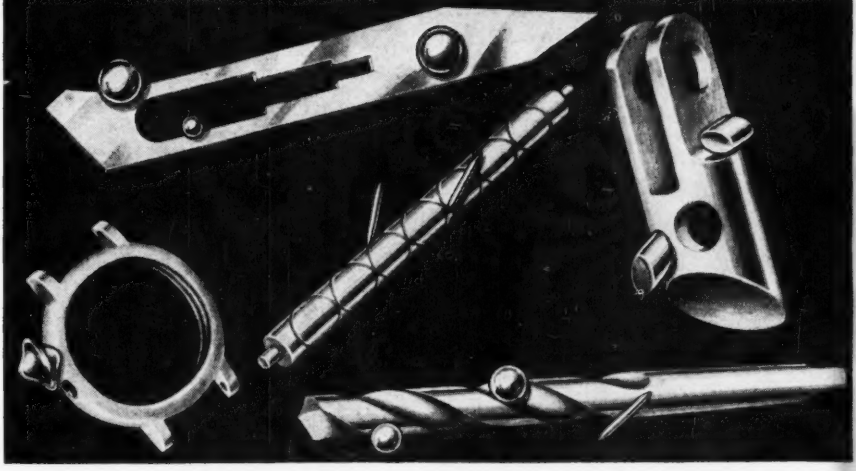

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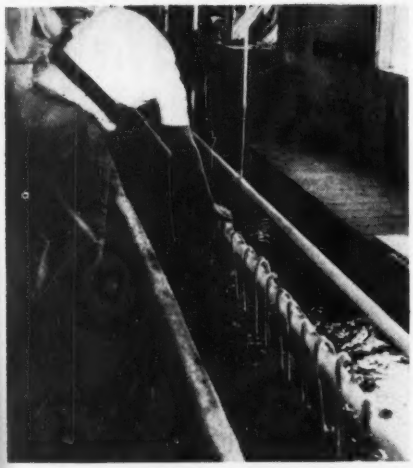

Fig. 2—Parts requiring less solution space are anodized in the 3-foot tank.

lined. The anodizing solution is maintained between 70 and 72 deg. F., and air-agitated. Power is supplied to each anodizing tank from a Hanson-Van Winkle-Munning 1500-ampere generator through tubular aluminum anode rods approximately 2 inches in diameter. Lead cathodes (or the lead tank lining in one tank) serve to complete the electrical circuit.

Since the work to be anodized is relatively clean, a short dip in a room temperature solution of caustic soda is employed to clean the metal surface and impart to it a slight etch. Following a thorough water rinse in cold running water, parts are hung in an anodizing tank for a 30-minute treatment at the required voltage and current (see Figs. 1 and 2).

Following this treatment, work is again rinsed thoroughly and sealed in hot, clear water at 200 deg. F. This tank is heated with fuel oil. A burner is located below one end of the tank, the hot gases are passed through channels below the tank and are exhausted through a stack located on the end of the tank away from the burner.

Following the sealing operation, parts are removed to the racking and unracking area, a view of which is shown in Fig. 3. As can be noted in the illustration, many products lend themselves to racking with wire, and 2SO aluminum is employed for this purpose. Some racks are made from 24ST aluminum. After anodized parts have been removed from racks, the anodic coating formed on the racks themselves is removed in the caustic cleaner so that it cannot act as an electrical insulator to prevent proper contact between the rack and the parts subsequently racked for processing.

As industrial activity in the Miami area has increased, more and more fabricators have availed themselves of the anodizing facilities of the Miami Metal Weatherstrip Company. The company also has facilities available to furnish colored anodic coatings if such are desired by the customer.

Fig. 3—A view of the racking and unracking area, showing some of the many parts which are given a protective oxide coating in this plant.

(Photos by PRODUCTS FINISHING)

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NEWS of the Industry

NEW PLANTS

After nearly half a century at 1645 Howard Street, Detroit, **ACME MANUFACTURING COMPANY,** manufacturer of automatic polishing and buffing machines, has moved to its recently completed plant located at 1400 East 9 Mile Road, Ferndale, Michigan, a suburb of Detroit.

Easily accessible from downtown Detroit, the plant is thoroughly modern, with every facility for efficient manufacturing, and allows ample room for present operations and future expansion. Added equipment and facilities for engineering and experimental work have been provided, making it possible to maintain and extend the service to industry which has made the growth and position of the company possible. The new facilities will permit maintaining machine displays under power, enabling customers to see actual parts undergoing polishing, buffing, deburring, and micro-finishing operations.

Established in 1910 by G. A. Carlson, Acme Manufacturing Company pioneered the design, development and manufacture of automatic and semi-automatic polishing and buffing machines. Specializing in this field, the company engineered and developed rotary, straightline, semi-automatic and special machines which are now in wide use in a great many industries here and abroad.

During World War II, Acme produced a variety of automatic machines for finishing operations on shells, aircraft parts and other parts, engineering special arrangements and fixtures to handle such jobs at high production levels.

Effective July 1, 1951, the **BACON FELT COMPANY** has been carrying on all its activities—sales, engineering, and production—in its new Taunton, Massachusetts factory where it recently moved from Winchester. With new, specially

A view of the new plant of Acme Manufacturing Company which has been located at Ferndale, Michigan.

designed felting equipment and larger production facilities, the company believes it will be in a better position to serve industry in its requirements of felt wheels, bobs, and sheets.

Announcement was made recently by Edsel Faulman, president of both firms, of the latest expansion programs of the **IMPERIAL PLATING RACK COMPANY** of Detroit and the **NATIONAL RACK COMPANY** of Paterson, New Jersey.

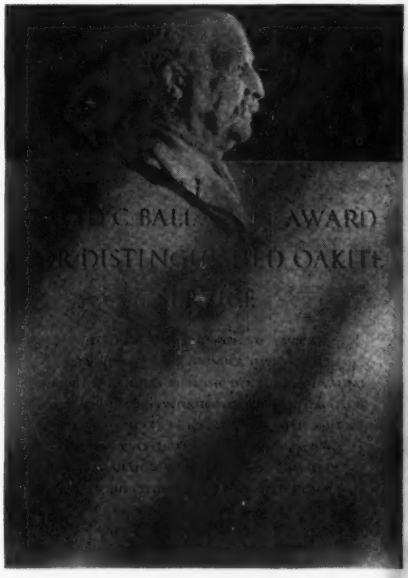
In Paterson, a building at 179-181 Madison Avenue will house the manufacturing and main offices. This division serves the Eastern industrial area with a line of engineered plating racks and rack coatings. The Detroit plant, at 1613 Industrial Avenue, serves the automotive industry and the Midwestern States. In Chicago, a new plant, **AMERICAN RACK COMPANY**, is located at 2324 West Lake Street.

HONORS

John A. Carter, president of **OAKITE PRODUCTS, INC.**, manufacturer of industrial cleaning and related materials, has announced the establishment by the company of the **DAVID C. BALL AWARD FOR DISTINGUISHED SERVICE**, a bronze plaque to be presented annually to the member of the Oakite technical field organization who has rendered the most outstanding service to industry during the year.

The award is designed to perpetuate the memory of David Clifton Ball, pioneer in industrial cleaning procedures, founder of the company, and chairman of its board of directors at the time of his death in March of this year. From the earliest beginnings of the Oakite organization in 1909, Mr. Ball insisted upon maintaining the principles of service which today characterize the work of the company's field service organization throughout industry.

"The Oakite technical service representative who wins this award," Mr. Carter stated, "will have exceptional ability to search out and set up improved methods that will cut cleaning costs and provide superior results . . . will have consistently made certain that his customers shared his know-how in using the correct material to best advantage . . . will have reported on his work in full, so that his fellow representatives might benefit from his experience. He must possess, above all, the true Sense of Service—an attitude which finds its expression in acts and actions that go beyond duty or obligation, and from which he derives great personal satisfaction."



David C. Ball Award for Distinguished Oakite Service

MAYNARD C. WHEELER, vice president in charge of production of Commercial Solvents Corporation, received the honorary degree of Doctor of Engineering from Purdue University at its ninety-third commencement exercises. The degree was awarded him in recognition of his technical achievements and his sympathetic and efficient relationship to the company's employees.

Mr. Wheeler joined Commercial Solvents in 1923. He has been superintendent of the Terre Haute fermentation department, Terre Haute plant manager, assistant to the vice president in charge of production, and was made vice president

in 1945. In 1950, Mr. Wheeler was elected a director of the company.

He is also president and a director of Thermatomic Carbon Company, a member of the American Chemical Society, and the American Institute of Chemical Engineers.

Thomas N. Armel

An award for outstanding sales achievement in 1950 in the Nubian Paint and Varnish Division of The Glidden Company has been announced by Dwight P. Joyce, president.

The Senior Salesman's Award of $1,000 was won by **THOMAS N. ARMEL**, industrial paint salesman in Chicago. Joining the company in 1940 after graduation from the University of Notre Dame, he has made outstanding contributions in his field of technical development of industrial finishing systems.

JOSEPH W. DISTEL was awarded the first college scholarship provided for sons and daughters of employees of the **PENNSYLVANIA SALT MANUFACTURING COMPANY** by George B. Bietzel, president. He was selected to receive the scholarship by a committee of prominent Philadelphia educators not connected with the company. Selection was made on the basis of college entrance board examinations, scholastic record, and citizenship.

COMPANIES

Sustained nation-wide efforts to sell **DeVILBISS COMPANY** products and demonstrate their full and multiple uses were emphasized at the last of a series of refresher courses for DeVilbiss Company field representatives in the spray finishing equipment division held at the company's research center.

Twelve company representatives from Ohio, Michigan, Pennsylvania, New York, Washington, D. C., Arkansas, Texas, and Missouri attended. Study of the plant, advertising program, government regulations, engineering and research progress, new products, and improvements in old products were on the agenda of this course.

William J. Ehlen, registered professional engineer, has announced the incorporation of Electro-Met Research Associates and Gary Company into **ELECTRO-LAB PROCESSES, INC.**, 3566 Colerain Ave., Cincinnati 23, Ohio.

With its original personnel and an expanded staff of graduate chemical engineers, the organization will provide a more complete service in the development and operation of electroplating and other metal finishing processes.

COMMERCIAL SOLVENTS CORPORATION has announced the creation of a group to conduct market development in industrial chemicals and the reorganization of the Technical Service Division. The changes are designed to strengthen the company's sales organization and to provide more efficient service to customers, according to H. J. Henry, vice president in charge of sales.

Dr. Frank E. Dolian, formerly assistant manager of the Technical Service Division, has been appointed manager of the Market Development Group. Assigned to his staff are the following personnel, previously in the Technical Service Division: Kenneth W. Bayha, San Francisco; A Mosher Cooke, Boston; Walter C. Gwinner, New York; and Louis L. Hallock, of the Terre Haute office.

The Technical Service Division, of which Charles D. Goodale is manager, will devote itself to product quality control and technical service for all divisions of the company. The staff of this division will be augmented to provide improved service to customers.

A new step in the **GLIDDEN COMPANY'S CHEMICAL AND PIGMENT DIVISION** expansion program was announced recently by Dwight P. Joyce, president.

Glidden will consolidate all its powdered metal operations on its 25-acre site at Hammond, Indiana, and will increase its output of cuprous oxides, cupric oxides,

lead, iron and copper powder, as well as its Cubond Brazing Compounds. At the same time, Glidden has disposed of its secondary metals operations located on a portion of the same Hammond property. These facilities, which include a lead refinery and equipment for production of type metal, babbit, solder, and antimonial lead products, have been purchased by three Chicago business men who will operate them as Metals Refining Co. Inc.

Glidden has been engaged in a Chemical and Pigment Division expansion program for more than a year. It is now in the process of moving its lithopone production from Baltimore to its large pigment plant in Collinsville, Illinois, and is nearing completion of a $3,000,000 titanium dioxide producing unit at its huge Baltimore plant, which will more than double its production of titanium dioxide.

An expansion of facilities for the production of basic chemicals at plants in Niagara Falls and Welland, Ontario, was announced recently by A. O. Williams, vice president of **NORTH AMERICAN CYANAMID, LTD.** Accelerated defense and civilian demand both in the United States and Canada for chemicals derived from products produced at these plants was given as the reason for the expansion.

A further step in the expansion program will be the installation of equipment which will increase American Cyanamid Company's capacity for the production of melamine at Willow Island, West Virginia.

NEW POSITIONS

The Brooklyn Varnish Co., Inc., Brooklyn, N. Y., has announced the election of **CARL L. ENGLEHARDT** to the board of directors.

Mr. Englehardt joined the company in 1931 and is currently technical director and in charge of the industrial research division. He has been an active member of the New York Paint & Varnish Production Club, and is the present chairman of the technical committee. He is also a member of A.S.T.M., A.F.S., and A.I.C.

Other new officers are **ROY B. ANDERSON,** president and treasurer; **DEAN C. ANDERSON, SR.,** chairman of the board; **JAMES W. WILSON,** vice president in charge of sales; and **ROBERT G. DOOLING,** secretary.

W. J. Cluff, president of Frederic B. Stevens, Inc., Detroit 16, Mich., has announced the appointment of **THOMAS R. WILLIAMS** as sales engineer in the plating and polishing department. He will represent the Stevens line in eastern Ohio, with headquarters in Elyria, Ohio.

Thomas R. Williams

Mr. Williams was formerly a laboratory technician with the Brown-Lipe-Chapin Division of General Motors Corporation in Elyria, and has had considerable experience in solution maintenance, quality control, and trouble shooting for various lines of plating equipment including Stevens.

A chemistry graduate of Alma College, Alma, Michigan, Mr. Williams has also done graduate work in chemistry at Wayne University, Detroit. He is a member of the Detroit Branch of the American Electroplaters' Society.

EDWARD N. CASE has been appointed product supervisor in the Synthetic Organic Chemicals Department, Industrial Chemicals Division of American Cyanamid Company. Mr. Case will assume responsibility for the marketing of all of the department's metal trades products, with headquarters at the company's New York office, 30 Rockefeller Plaza.

Prior to this appointment, Mr. Case was group leader of the metal trades laboratory in the Technical Service and Development Division of Cyanamid at Stamford, Connecticut.

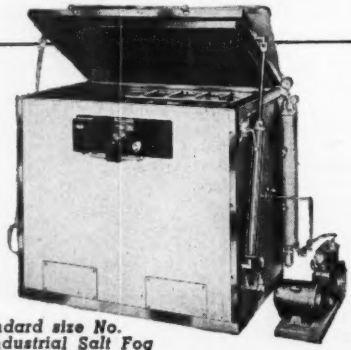
HERBERT B. SLIGER, formerly assistant general sales manager, has been appointed manager of the purchasing department of Commercial Solvents Corp., New York 17, N. Y., it has been announced by J. Albert Woods, president. Mr. Sliger will coordinate the company's entire purchasing program which has expanded in line with the growth and diversification of the company's activities.

ACCEPTED

Salt Fog

CORROSION TEST UNITS

BY INDUSTRIAL



Standard size No. 1 Industrial Salt Fog Testing Cabinet. Larger sizes are engineered to suit requirements.

for over-all economy . . .

You have nothing to lose—and much to gain—when you make salt fog tests in an INDUSTRIAL cabinet. These cabinets are built to meet A.S.T.M. B-117-44T salt spray test, also Army, Navy, and Air Force standards.

Consider these features:

- Lucite nozzle with fixed orifice that does not corrode or clog.
- Rubber-lined box for protection against corrosion.
- Accurately controlled enclosed heating.
- Fully insulated for heat economy.
- Air by-pass valve to clear cabinet before inspection of specimen.
- Exhaust flange at rear.
- Air compressor with oil filter. (Cabinet can be connected to other air supply.)
- Air-operated cover lifter (extra).

INDUSTRIAL FILTER & PUMP MFG. CO.

5904 Ogden Avenue Chicago 50, Illinois

Mr. Sliger will report to Maynard C. Wheeler, vice president in charge of production and, for the present, will maintain offices in both New York and Terre Haute, Indiana. John H. Hassmer will continue as purchasing agent with headquarters in Terre Haute.

A graduate of Rose Polytechnic Institute with a degree in chemical engineering, Mr. Sliger has been active in the chemical field for many years. He joined Commercial Solvents in 1927. He is a member of the American Chemical Society, S.A.A.C.I., and B.I.M.S.

Industrial Tape Corp., a subsidiary of Johnson & Johnson at New Brunswick, N. J., has announced the appointment

John L. Callahan (left), George A. Fitzgerald

of **GEORGE A. FITZGERALD** as sales manager of automotive products, and **JOHN L. CALLAHAN** as merchandising director.

Mr. Fitzgerald has been with Industrial Tape since 1938, most recently as division manager in Los Angeles. He formerly was with Easton Manufacturing Co., Cleveland.

Mr. Callahan formerly was sales manager of the Flako Products Corporation, and served in sales, merchandising, and advertising capacities with several other companies.

JOHN M. ROBINSON, vice president-finance, The DeVilbiss Company, Toledo, was elected a member of the board of directors at a recent special board meeting.

Mr. Robinson joined the company as treasurer in 1946, with a background of industrial accounting and public tax and accounting work. In January 1950 he was advanced to vice president and treasurer, and in April of this year he assumed the financial vice presidency. He is a certified public accountant in the State of Ohio and is a member of the Controller's Institute of America.

Eugene S. Massey

The assignment of **EUGENE S. MASSEY** as technical sales representative in Cleveland for Hercules Powder Company's Synthetics Department has been announced. He will assist W. W. Trowell, manager of Synthetics' Cleveland office.

Mr. Massey joined Hercules as a chemist in October 1950. Recently he has been preparing for his new assignment by familiarizing himself with various technical problems concerning the application of synthetic resins in protective coatings, adhesives, and other products.

Four technicians have recently joined the sales service staff of the Atlas Powder Company's industrial finishes laboratories at North Chicago, Illinois.

ALEX ANDREONI, a graduate of the University of Illinois, has joined Atlas after several years with the Franche Paint Company in Chicago. He is a specialist in the formulation of wrinkle, hammer, and other specialty types of finishes.

LESTER H. ZANDER comes to Atlas from the Dibbel Color Company, Division of Pratt & Lambert. Mr. Zander attended Michigan State College and Detroit Institute of Technology and has specialized in the development of automotive baking synthetics.

ROBERT S. SPIEGEL, who will serve as an evaluation and physical testing chemist, comes to Atlas from Interchemical Corporation. He majored in chemistry at the University of Illinois and has done graduate work in this field at the University of Minnesota.

GLENN CREATH, who specialized in synthetic automotive enamel work and technical developments in the synthetic finishes field with the Pittsburgh Plate Glass Company for several years, has also joined the technical service staff. He is a graduate of the University of Illinois and Northwestern University.

William Hogenson, president of Chicago Vitreous Enamel Product Co., Cicero 50, Ill., has announced the resignation of **B. T. SWEELY,** vice president in charge of research, and the appointment of **E. E. HOWE** as director of research.

E. E. Howe

Mr. Sweely headed the laboratory of Chicago Vit for many years, and his technical skill will still be available to the company on a consulting basis.

Mr. Howe received his B.S. degree in ceramic engineering in 1931 and his M.S. degree in 1934, both from the University of Illinois. Following this, he joined Chicago Vit as a ceramic engineer. He spent considerable time in connection with physical testing, frit control, and development work, and served as a sales engineer on field service problems. In 1942 he was appointed chief metallurgist and in 1946 became an assistant director of research.

CHARLES A. BONN has been appointed abrasive grain engineer for Norton Co., Worcester, Mass. Mr. Bonn will cover principally Ohio and Michigan. He will make his headquarters in the company's Cleveland district office.

ROY T. SMITH, associated for 22 years with James B. Day & Co., Chicago, Ill., manufacturer of paints, varnishes, and lacquers, has been appointed sales man-

ager, it was announced recently by Arthur T. Day, president.

Mr. Smith will direct industrial and trade sales of protective and decorative coatings.

Albert A. Hally

ALBERT A. HALLY, former sales manager of Texcel Cellophane Tape and merchandising director of Industrial Tape Corp., New Brunswick, N. J., a subsidiary of Johnson & Johnson, has been appointed sales manager of the Industrial and Commercial Department.

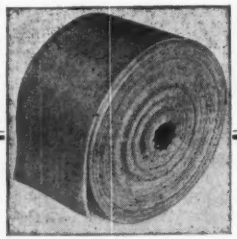
Mr. Halley has been with Industrial Tape since 1948. Prior to this he was merchandising manager and regional manager for the Dennison Manufacturing Company.

Velsicol Corporation, Resin Sales Division, has announced the transfer of **W. H. BURNS** from the Chicago sales office to the New York sales area.

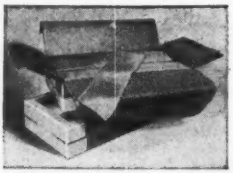
Mr. Burns, a chemical engineering graduate of Illinois Institute of Technology, joined Velsicol Corporation in 1948 as a laboratory assistant. For the past 1½ years he has been in technical sales in Chicago.

W. H. Burns

The Neilson Chemical Company of Canada, manufacturer of Prep Products for cleaning, rust-removing, and general conditioning of metal surfaces before painting, has recently appointed **S. BROWN** and **JACK GRAY** to its technical staff in Montreal and Toronto.



IN ROLLS
Cut off any size piece and use as needed.



CUT BULK
Already cut and folded, ready to use.

NOW! Tack Cloth in Handy Rolls or Cut Bulk

Now you can get Tack Cloth packed the way it's easiest for you to use—either in 150 yard rolls of 36" wide cloth or in handy cartons—100 or more Tack Cloths to the carton.

No matter which way you buy it, you can be sure that every square inch will *stay* SOFT and TACKY until the very last bit is used up.

The Cut Bulk size is 18" x 36"—folded to 4½" x 18" for easy handling. *All of our Tack Cloth is Spontaneous Combustion-Proof, Lint-Free and Wax-Free.* It's clean and sanitary—*there's no waste.*

Write today for complete information, prices and samples.

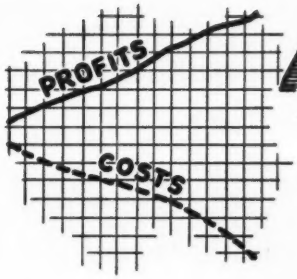
BAUGHN CHEMICAL PRODUCTS CO.

The Tacky Wiper Specialists

7019 N. Ravenswood **Chicago 26, Ill.**

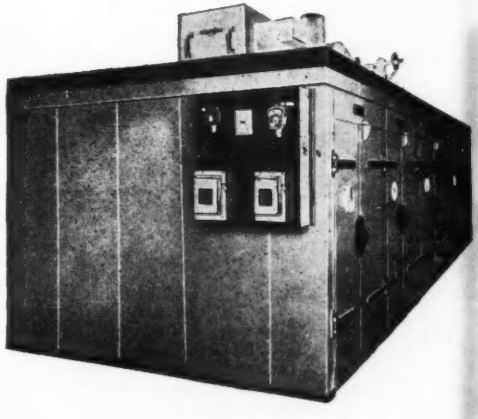
Also Individually Packed in Glassine Envelopes — 144 to the Carton

— A WARRANTY OF SATISFACTION IN EVERY CARTON —



PRODUCTION!

GEARED TO
GIVE YOU
GREATER
PROFITS . . .



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KOCH

TRUCK-TYPE BAKING OVENS

Ovens on a production-line basis!

That's a big reason why KOCH can supply your requirements quickly and at lowest cost.

KOCH ovens are flexible. The basic unit may be added—in length or depth—at the time of installation, or later when production demands.

Low cost . . . efficiency . . . flexibility—KOCH supplies these advantages that mean long-run profits to you.

Phone, Wire or Write for Catalog sheets

P-81

GEORGE KOCH SONS, INC.
EVANSVILLE, INDIANA

Benson M. Austin

Industrial Tape Corp., New Brunswick, N. J., a subsidiary of Johnson & Johnson, has announced the appointment of **BENSON M. AUSTIN**, as product manager of its Industrial & Commercial Department.

Mr. Austin, who was formerly division manager in Chicago, has been with Industrial Tape since 1945. Before that, he was with the General Motors Corporation and the Gulf Oil Company.

SOCIETIES

The Government Business Committee of the **PORCELAIN ENAMEL INSTITUTE** reports that considerable progress has been made by the porcelain enamel industry in reducing the amount of cobalt required for enameling operations. Formerly 2.2 pounds of cobalt per ton of steel were used, but the ratio now has been cut to 1.3 pounds of cobalt per ton of steel.

According to a PEI Committee spokesman, these figures were revealed at a meeting between National Production Authority officials and the Frit Manufacturer's Advisory Committee held recently in Washington. At the meeting, it was agreed that porcelain enamelers should supply NPA with figures on how much cobalt is needed and how much finished product can be produced with it, for NPA guidance in studying cobalt needs for defense porcelain enameling operations as well as appliance manufacture.

Cobalt, a critical material in many defense products, is the metal-adhering agent used in the porcelain enamel ground coat. The spokesman for PEI states that a further reduction in the ratio of cobalt to steel is deemed impossible without encountering serious manufacturing difficulties.

meetings

OF INTEREST TO FINISHERS

Sept. 3-7. Diamond Jubilee Meeting, American Chemical Society, New York, New York.

Sept. 10-14. Sixth National Instrument Conference and Exhibit, Instrument Society of America, Sam Houston Coliseum, Houston, Texas.

Oct. 8-12. 39th National Safety Congress and Exposition, Stevens, Palmer House, Congress, Morrison, and La Salle Hotels, Chicago, Illinois.

Oct. 10-12. Annual Shop Practices Forum, Porcelain Enamel Institute, Ohio State University, Columbus, Ohio.

Oct. 10-13. Fall Conference, The Electrochemical Society, Statler Hotel, Detroit, Michigan.

Oct. 15-19. 33rd Annual Metal Show and National Metal Congress, Detroit, Michigan.

Oct. 18-20. South Central Regional Meeting, National Association of Corrosion Engineers, Corpus Christi, Texas.

Oct. 23-25. 54th Annual Convention, International Association of Electrotypers & Stereotypers, Hotel Kenmore, Boston, Massachusetts.

Oct. 29-31. 63rd Annual Convention, National Paint, Varnish and Lacquer Association, Chalfonte-Haddon Hall, Atlantic City, New Jersey.

Nov. 1-3. 29th Annual Meeting, Federation of Paint and Varnish Production Clubs, Chalfonte-Haddon Hall, Atlantic City, New Jersey.

Nov. 26-Dec. 1. 23rd Exposition of Chemical Industries, Grand Central Palace, New York, New York.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

OUTPUT BLUES?

MAN—HERE'S NEWS!

In installation after installation it is the same story . . . A CHICAGO RUBBER wheel . . . the right belt . . . a combination ENGINEERED for the job . . . and work quality goes up . . . output skyrockets . . . worker fatigue goes down . . . and problems go out the window. R52

No matter what your grinding or polishing operation is we can show you how to do it faster, better and cheaper. This all adds up to one thing . . . money in your pocket. And remember . . . the cost of such an installation is small, really negligible compared to the savings it will provide. R51

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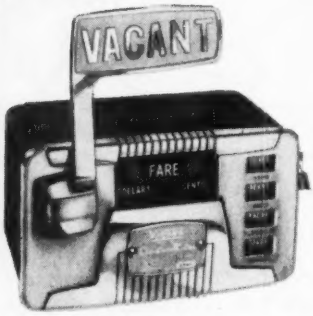
"IT'S THE WHEEL THAT DOES THE WORK" R50

CHICAGO RUBBER COMPANY, INC.

Main Office and Factory 2620 N. Clybourn Ave., Chicago 14, Ill.

MAKERS OF THE "COSMOWHEEL"

Finishes



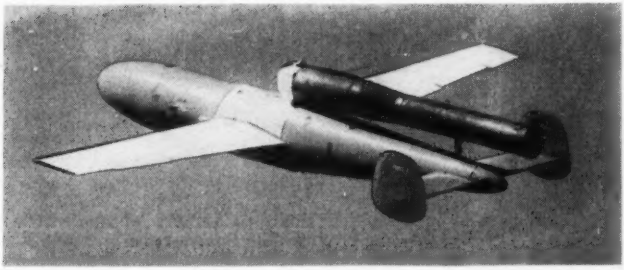
The front plate and flag of this Taxi-Meter are finished in polished chromium plate on a polished surface and satin chrome on a sandblasted surface; the case is Hammertone baking enamel; and the letters on the name plate are polished chrome on a background of vitreous maroon enamel.

(Photo courtesy The Viking Tool and Machine Corp., Belleville 9, N. J.)

Welcome in any household is this Youngstown Kitchens' automatic dishwasher. A chrome plated wire basket surrounds the chrome jet tower. The tub, lid, and exterior surfaces are finished in porcelain enamel.

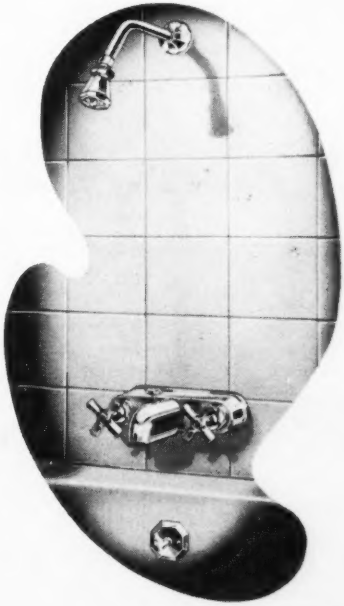
(Photo courtesy Mullins Manufacturing Corp., Warren, Ohio)

that aid in appearance and utility



The Navy's KD2G-2 target is a pilotless aircraft propelled by a pulse jet power unit. All its aluminum parts are etched with Oakite, and receive one coat of zinc chromate primer and two coats of lacquer. The steel parts are coated with two applications of zinc chromate and two coats of lacquer.

(Photo courtesy Globe Corp., Joliet, Ill.)



These tub and shower fittings are made of cast brass, polished. They then receive a copper plate, bright nickel plate, and a final chromium plate.

(Photo courtesy Briggs Manufacturing Co., Detroit 11, Mich.)

New • EQUIPMENT • MATERIALS • PROCESSES

Nalco Unistrut Drying Units

Unistrut Infra-Red Portable Units provide efficiency and flexibility in industrial drying and baking of all kinds, according to the manufacturer, North American Electric Lamp Co., 1020 Tyler St., St. Louis 6, Missouri.

Available in 4-lamp strips (or multiples of four), the units can be quickly and easily combined to form continuous banks for large or small drying areas, as the need arises. Their portability makes them extremely convenient and popular where space requirements have to be taken into consideration.

These assemblies may be tilted to any angle or swung in vertical or horizontal positions for concentrated heating and drying, when and where it's needed. They are constructed of rugged Unistrut framework to ensure long wear under hard factory or shop usage. Furnished with Nalco inside-aluminumed, self-reflecting type lamps, the units are wired for any commercially available voltage and phase.

Nalco Unistrut Infra-Red Portable Drying Unit

Accessory Deburring Barrel

An attachable accessory for the Tumbler-Mixer machine which will handle up to 50 pounds of material has been marketed by the Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14, Ohio.

Constructed of welded, watertight, 14-gauge steel, the Burring Barrel is readily attachable to the turntable of the basic machine with four machine bolts. It has a gasketed cover which is attached with one screw, measures 6¾ inches

high, has 17-inch diameter, and 5-gallon volume. In operation, metal parts to be deburred are placed in the barrel with abrasive grains and water. Gentle rolling operation causes the abrasive grains to grind away burrs on enclosed metal parts.

Chromate Coating Process for Zinc and Cadmium

Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Conn., has announced the development of a simplified process for producing chromate coatings on zinc and cadmium. The process is applicable for both zinc plate and zinc base die castings. In the process from 1 to 2 ounces of salts are used per gallon of water. The mixture is operated at room temperature, and after immersion for a few seconds, an adherent, chromate coating is produced. No elaborate means of control are said to be necessary.

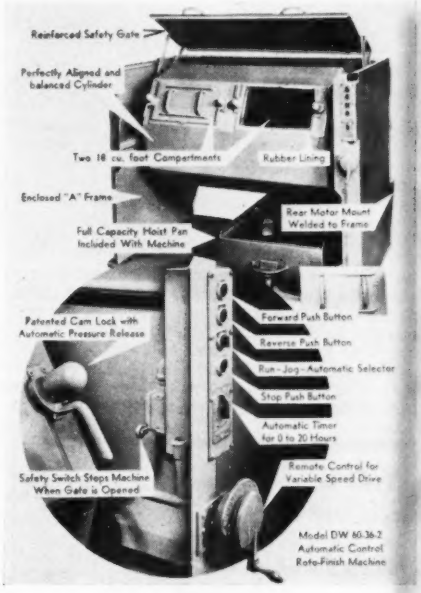
The coatings produced meet all existing specifications referring to chromate coatings on zinc and cadmium. Salt spray resistances on zinc plate are over 200 hours and on cadmium plate are over 500 hours.

Various colors can be applied to the "Enthox" coatings by means of suitable dyes. The coatings can be dyed jet black, red, and several other shades of color. It is claimed that Enthox coatings are excellent bases for organic finishes, including paints, enamels, and lacquers.

Precision Tumbling Machine

Large quantities of parts can be precision finished at one time in the Model DW-60-36-2 Automatic Control precision tumbling machine recently developed by the Roto-Finish Co., 3704 Milham Rd., Kalamazoo, Mich. Compact and easily accessible for speed of operation and maintenance, it is push-button operated, having all controls conveniently located on one compact panel. It has jogging provisions and a magnetic reversing starter with 110-volt control transformer. Once the machine is started, an automatic timer will stop its operation at any time from 0 to 20 hours without further attention. It also has a 5 h.p. variable speed power unit with a remote control handle for adjusting the speed of the cylinder from 10 to 30 revolutions per minute.

According to the manufacturer, the operator works in complete safety. A safety switch prevents the machine from operating whenever the reinforced safety gate is raised. Patented cam locks on the doors have spring-loaded pressure releases to prevent excessive pressure


Reinforced Safety Gate
Perfectly Aligned and balanced Cylinder
Two 18 cu. foot Compartments
Rubber Lining
Enclosed "A" Frame
Rear Motor Mount Welded to Frame
Full Capacity Hoist Pan Included With Machine
Patented Cam Lock with Automatic Pressure Release
Forward Push Button
Reverse Push Button
Run-Jog-Automatic Selector
Stop Push Button
Automatic Timer for 0 to 20 Hours
Remote Control for Variable Speed Drive
Safety Switch Stops Machine When Gate is Opened
Model DW 60-36-2 Automatic Control Roto-Finish Machine

Precision Tumbling Machine

buildup within the machine. The motor is mounted on the rear of the machine for safety, motor protection, and ease of maintenance.

Rigidly built of $\frac{3}{16}$-inch steel, each of the two compartments of the unit has a capacity of 18 cubic feet. Side supports, motor mount, and floor are all integral parts of the frame. Because of this rigid construction, the machine does not have to be bolted to the floor of the building. Heavy channel "A" supports are fully enclosed to prevent lodging of chips, and make the machine easier to clean.

Cylinder shafts are mounted in 2 $\frac{7}{16}$-inch self-aligning ball bearing pillow blocks. All cylinders are made in jigs to achieve perfect alignment, and shafts

are double supported with gussets and bells. As a result the machine should provide many years of trouble-free operation. It has been designed for use with the hoist pan system of loading and unloading.

Polyethylene Tank Liners

Completely welded polyethylene plastic tank liners, both removable and stationary types, are available from the American Agile Corp., Plastics Div., 5806 Hough Ave., Cleveland 3, Ohio. These liners can be furnished in all sizes and shapes with wall thicknesses up to 1 inch and are fabricated entirely of polyethylene to the customer's specifications by the Agile hot gas welding method.

Tank liners can be furnished with polyethylene drains and flows, including pipe flanges, fittings, and valves also made of polyethylene. These component parts can be directly connected to other existing pipe lines and installations.

According to the company, the chemical inertness of polyethylene and the hot gas welding method employed in the fabrication of these tanks guarantee a leak-proof liner and reduce maintenance and replacement expense of storage and plating tanks containing corrosive liquids. Another important feature of liners of this type and construction is that they weigh but 1/13 of the weight of lead, and in proportion are much lighter than other metals used for tank lining.

Complete fabrication of these units may be done at the Agile company's plant or on the site of the final and permanent installation, depending upon the size and complexity of design.

YOU
can *rely* on
RANDOLPH
for prompt shipment
in any quantity of

Performance - Proved
Government Specification

FINISHES

Lacquers • Enamels • Dopes • Thinners
Clear Metal Finishes • Colored Lacquers
Clear S.G. for Metal • Texture Enamels
Specialized Production Finishes
Aircraft Finishes

RANDOLPH
PRODUCTS CO.
CARLSTADT, NEW JERSEY

Auralite

Water soluble gold alloy plating salts, known as Auralite salts, have been developed by the Platers Research Corp., 59 E. 4th St., New York 3, N. Y. They are available in all the popular shades of yellows, Hamiltons, lilacs, pinks, greens, and so on. Matched shades are also available.

The alloy gold plating solution is made up by dissolving one bottle of Auralite salts (which can be stored until needed) into four gallons of water. A stock solution can also be made of any desired concentration for replacement.

Airflow Buffing Wheel

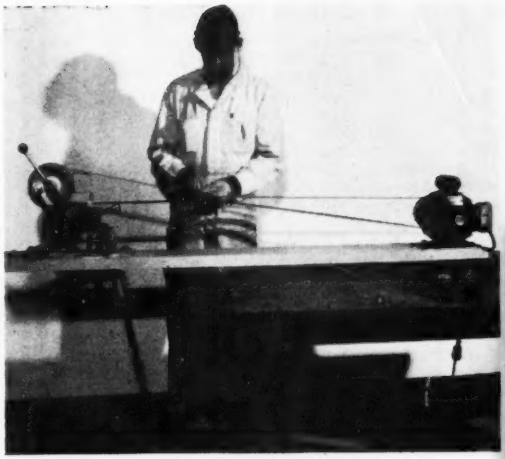
Product of the United Buff Products Corp., 242 Oak St., Passaic, N. J., the Airflow "Pressure-Cooled" Buffing Wheel is recommended for many finishing operations, and is being used in the lamp, automotive, silver, stainless steel, copper, plastics, and other industries.

Ready for use as supplied, the wheel requires no breaking-in, no inserts, spacers, or dividers, and is said to provide perfect finishing on all contours on hand or automatic operations. The manufacturer claims that it reduces job time, production time, and down time; it will not ravel or burn, and reduces compound consumption. Messy "ashing" operations are eliminated on plastics.

Aroflint 131

Aroflint 131 is a room temperature curing phenolic-type resin introduced by

Behr-Manning Belt Strapping Unit in use



U. S. Industrial Chemicals, Inc., 60 E. 42nd St., New York 17, New York.

Made with a new catalyst, U.S.I. Accelerator FX 134, which improves the properties of Aroflint coatings on metal, it imparts excellent adhesion to metallic surfaces. Coatings catalysed with FX 134 have been found useful for numerous special applications on rigid metal surfaces, the manufaceurer states.

Aroflint 131 without catalyst can also be utilized as a baking finish on metal in the production of chemical and solvent-resistant coatings for tanks, drums, and similar applications.

High-Speed Phosphatizing Compound

Only one to two minutes is required for a phosphatizing process developed by Kelite Products, Inc., Box 2917, Terminal Annex, Los Angeles 54, Calif. The product, called Keykote, is manufactured in powder form and is used in a concentration of one ounce per gallon. It can be applied by either spray or immersion.

Keykote can be used as low as 3 pH and no stainless steel equipment is required. Black iron tanks are adequate and no screen is required since Keykote will not "sludge out." No powder will remain on the work, whether sprayed or immersed, and it is not necessary to follow with a rinse, it is stated. However, Keykote may be rinsed where specifications require it.

Belt Strapping Unit

Inside diameter grinding, polishing, and deburring operations are said to be greatly simplified by the use of a belt strapping unit developed by Behr-Manning Corp., Dept. PF, Troy, N. Y. Easily set up with a polishing jack on a motor drive and spring tension small backstand idler, the unit is claimed to greatly reduce the time normally required in the i.d. finishing of such items as forged parachute hardware, scissor and tin shear eyes, surgical instruments, and so on. No shut-down time is involved in threading the coated abrasive belt through the opening of the piece being finished, since the operator merely releases the belt tension with a foot treadle which allows for belt slippage at the drive unit.

Metalite cloth abrasive belts, available in grit ranges from very coarse to very fine, are said to readily produce finishes from rough removal of mold fins to extremely fine finishes which are required prior to plating.

Fire-Gard Paint

Capable of withstanding temperatures up to 1900 deg. F., and claimed to be applicable to all types of metal or wood surfaces, a series of high temperature paints known as Fire-Gard have been developed by Fire-Gard, Inc., 1424 K St., N. W., Washington 5, D. C.

Said to form a bright finish that is resistant to high temperatures, moisture, corrosion, mild acids and mild alkalies, and oxidation or fumes encountered in industrial plants, the paints are available in aluminum and most other colors, including black and white.

Applied by conventional methods, Fire-Gard can be used on all surfaces formerly regarded as unpaintable due to deterioration by high temperature, atmosphere, or other corrosive influences.

Nopco 1067-A Surfactant

Nopco 1067-A, a surface tension depressant, has been marketed by the Nopco Chemical Co., Harrison, N. J. Especially designed for use in mineral acid solutions, it is said to show unusual promise for use in pickling, anodizing, wire treatment, and similar operations.

According to the manufacturer, plant performance tests show savings of acid by increasing drain-off of pickling solution from metal work 30 to 40 per cent, and in reducing acid contamination in subsequent handling. Low surface tension values are maintained in cold and hot sulfuric and other acids in concentrations up to 25 per cent. In certain processes where fuming occurs, the use of Nopco 1067-A has greatly facilitated fume control.

Stop-Off and Masking Coating

Maskcoat No. 2, for quick masking jobs by immersion dipping, has been marketed by the Western Coating Co., 85 W. Union St., Pasadena 1, Calif. The coating is claimed to provide sharp and distinct stop-off lines, for use in masking critical areas for plating. It can be stripped off easily, and is said to be non-contaminating to all common plating solutions, including bright nickel.

In use, the part to be masked is dipped into the melted coating material, and is ready for trimming in a few seconds. According to the manufacturer, it can be remelted for use again.

Quick-Acting Solvent Cleaner

Du-Lite Chemical Corp., Middletown, Conn., has developed Dynakleen, a powerful soak solvent. Designed specifically for the quick removal of buffing and drawing compounds from knurled or fluted surfaces of all metals, Dynakleen will remove all types of soils including greases, oils, and discolorations in less than a minute, it is claimed.

Dynakleen requires no heating or special tanks, and can be used in spray washing machines or applied by hand. It is a safety solvent which dries quickly and can be used over and over with only

Brand New!

BAR-L Vapor DEGREASER

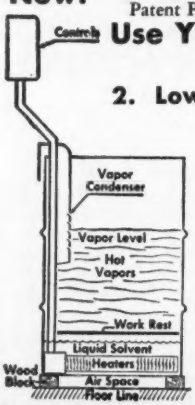
Patent Pending

Use Your Solvent Drum for a Tank

1. Efficient Cleaning

2. Low Investment 3. No Fire Hazard

HOW A DEGREASER WORKS



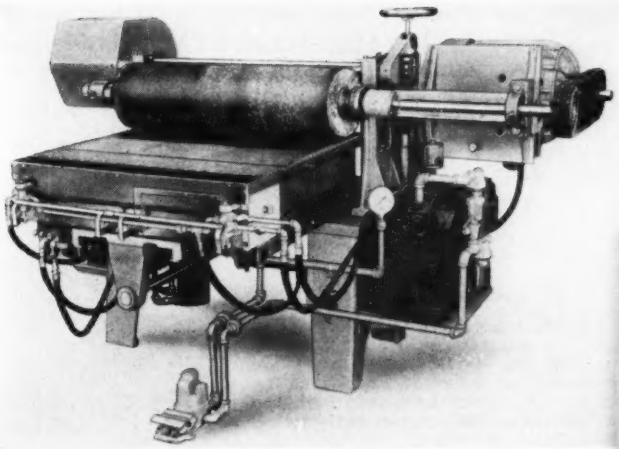
Trichlorethylene solvent is heated to a boiling point in the lower section of the drum. Vapors condense on work and wash off oil, grease and dirt. Most parts can be cleaned in less than 60 seconds. Solvent vapors are kept *inside the drum* by a scientifically-designed condenser which returns the solvent to the boiling chamber. REMEMBER: Anything that can fit into a solvent drum can be cleaned in a BAR-L Degreaser! And it's priced right! *Write for complete details.*

Manufacturers Processing Co.

METAL CLEANING CHEMICALS AND EQUIPMENT

P. O. BOX 6 • DETROIT 20, MICHIGAN

Clair Model 203 Surface Finishing Machine



occasional filtration. It is an ideal conditioner for preparing metal surfaces prior to plating, painting, phosphatizing, galvanizing, and so on, the manufacturer states.

Clair Model 203 Surface Finishing Machine

A surface finishing machine capable of holding non-magnetic items without interference with coverage over the entire surface has been introduced by Clair Manufacturing Co., 1010 S. Union St., Olean, N. Y. While holding magnetic products in position with a magnetic chuck is standard procedure, the Clair Model 203 Machine, with its vacuum chuck, is claimed to hold items made of brass, copper, silver, plastic, aluminum, and other non-magnetic materials.

The horizontal, electro-hydraulic machine has a moving work table consisting of a perforated plate mounted over a sealed air space, this space being connected to a vacuum pump through a four-way spring-return foot valve. Offering a maximum working area of 38 x 36 inches, the perforated plate is covered by a rubber mat.

In operation, the table moves both "in and out" and "sideways" under the revolving buff spindle. Length of the "in and out" stroke of the vacuum table is adjustable from ¾ to 36 inches, "sideways" ½ to 1¾ inches. Without interfering with the vacuum action, raised pads, conforming to the contours of the parts being finished, eliminate the danger of buffs coming in contact with the mat.

The Clair Model 203 Machine may be supplied with 5, 7½, 10, or 15 h.p. motors. Buffs up to 12 inches in diameter and 40 inches in length can be mounted on the spindle. An air circuit provides automatic float of buff at any predetermined uniform pressure.

The Clair Model 203 Machine is available with smaller sized vacuum tables, platform type tables for mechanical holding, as well as a variety of optional modifications. It is particularly recommended by the manufacturer for use in surface finishing non-magnetic products such as compacts, cigarette cases, lithograph sheets, flatiron sole plates, blanking stock, kick and push plates, fan blades, name plates, escutcheon plates, and so on. This finishing machine, with its vacuum chucking mechanism, also is used for surface finishing many magnetic products.

Surface Tension Instrument

Joseph B. Kushner Laboratories, 115 Broad St., Stroudsburg, Pa., has announced the development of the "Sur-Ten Meter" for rapid, easy, and accurate measurement of surface tension. The device, which gives surface tension readings accurate to within 5 per cent or better, is ideally suited for routine surface tension control under production conditions, where there is a need for a simple and quick method for determining the surface tension of a process liquid or liquids.

Made of sturdy plate glass in a convenient overall size of 7 x 5 x 1 inch, the

For more complete information on products and processes use READER SERVICE CARDS inside covers.

scale of the Sur-Ten Meter is printed with a fired ceramic enamel so that it can be used with all types of solutions except those containing free fluorine ions.

Electroplating Rectifier

Electronic Rectifier Co., Inc., Rochester 2, N. Y., has developed a selenium rectifier for the electroplating and electrochemical industries. Measuring 22 inches wide x 18 inches deep x 25 inches high and weighing 160 pounds, features of the unit are as follows:

Circuit: full wave rectifier circuit with voltage continuously variable from 0 to 8 volts d.c. at 150 amperes capacity, or 0 to 16 volts d.c. at 75 amperes capacity. Convenient voltage change terminals and d.c. output terminals are mounted on the rectifier front panel.

Meters: ammeter and d.c. voltmeter are of the 3½-inch rectangular panel type with D'Arsonval movements and 2 per cent accuracy.

Style "RA" 150-Ampere, Continuous Duty Electroplating Recitfier

Circuit breaker: accurately calibrated, fully magnetic type (not thermal) which provides full protection at all voltage settings.

Cabinet: heavy gauge pressed steel, arranged for wall, shelf, or floor mounting, with hinged top cover for easy access to a.c. terminal strip.

Reliable "Viscolator"

The Viscolator has been designed by the Reliable Products Mfg. Co., Inc., 123 DeKalb Ave., Brooklyn 1, N. Y., to make possible the spraying of high solids content lacquer, synthetic, and other similar materials at elevated temperatures. The method used is one of proper predetermined thermostatically controlled

FORM-A-ROC
FIRST-COAT
FOUNDATION
FOR FINE FINISH

1. Dries with lacquer speed.
2. Has double lacquer solids at spray gun.
3. Fills very well—sands easily.
4. Adheres tenaciously to steel, wood, presdwood, aluminum, galvanized metal, etc.
5. Holds out lacquer, synthetic or oleoresinous enamels exceptionally well.
6. Thins 3:1 with xylol.
7. Available in GREY, SALMON and OFF-WHITE.
8. Ground well to smooth texture.

MADE BY
The Varnish Products Company
5208 Harvard Avenue Cleveland, Ohio

temperatures. Less thinner is said to be required and a faster, more uniform finish equal to two or more coats of cold material is obtained. With this unit the manufacturer claims that 60 per cent more solids content may be sprayed with hot synthetic than with cold, and 45 per cent more, or over, of solids content with hot lacquer.

Reliable Model 2-P "Viscolator"

The Viscolator heats the material to reduce its viscosity by electricity, steam, or in combination, and is manufactured in capacities from 8 to 250 g.p.h. output in the non-recirculating and recirculating types. (The recirculating type is recommended for use with hot lacquer.) All units up to 40 g.p.h. output are electrically heated. The heating elements and the material-carrying tubes are embedded in solid metal, producing fast heat transfer. With the recirculating type, the heated material is circulated to the spray gun by a system motivated by air or electric-driven pump, which draws direct from the material container so that a pressure tank is not required. Heated air is provided if desired.

Outstanding features claimed by the manufacturer for the Viscolator include: no liquid or any other additive is used in models up to 40 g.p.h. output; simplicity of design (Should the material-carrying tubes clog due to negligent operation, they are easily cleaned without dismantling the unit. This may be done by anyone without special skill); easy accessibility for pressure or temperature adjustment; explosion proof; minimum temperature drop; fast heating (In 15 to 20 minutes the heated material is ready to be sprayed at temperatures of 160 to 180 deg. F. Higher temperatures may be obtained if desired.); each unit is equipped with pilot light to indicate operation of electric heating elements, and material temperature indicator.

With the Viscalator it is said to be possible to obtain the following advantages: solids are higher and thickness obtained for each pass is greater; solvent waste is lower; coverage per gallon is increased; fewer coats are needed; capacity of the finishing plant can be increased; finish has better flow-out and less tendency to sag; blushing and orange peel are eliminated; possibility of using higher viscosity materials in formulating for hot spray, thus providing films with greater cold-check resistance, tensile strength, and toughness, at no loss of solids; ordinary surface imperfections may be covered with one coat.

Looking for a Better Finish?

Try

HARRISON'S

4A

TAILOR-MADE
BUFFING & POLISHING COMPOUNDS

for

Aluminum, Brass, Copper, Stainless Steel, Carbon Steel, Etc.

EMERY CAKE, GREASE STICK

CEMENT AND THINNER
for setting up wheels, belts, and rolls

HARRISON & COMPANY, INC.
Haverhill, Massachusetts

PRODUCT LITERATURE

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Birth and growth of the second largest source of aluminum in the United States is outlined in a book **"Reynolds Aluminum and The Company That Makes It,"** issued by Reynolds Metals Co., 2500 S. Third St., Louisville, Ky. This 48-page, 8½ x 11 book also contains details on Reynolds production facilities, products, fields served, and other information designed to give a clear picture of the company and its operations.

The production of aluminum from bauxite, the characteristics of aluminum, the many product forms in which it is made, and the varied applications for them are all covered in the book, which contains more than 250 illustrations.

Spray Mask Finishing. Production methods and techniques for the spray mask painting of decorative designs, toys, emblems, escutcheons, name plates, control knobs, and indicator plates on plastics, die castings, and metal stampings are the subject of a six-page, seven-color folder available from Thierica Studio, 412 Henry Ave., S.E., Grand Rapids, Mich. Information covers the five basic masks with complete description of how, when, and where they apply.

Self-Illuminating "Pen" Microscope. Descriptive data and illustrations of this model, together with prices, are given in a pocket-size leaflet available from Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Maryland.

"Grits That Grind," a new Norton Company color motion picture on abrasives and grinding wheel manufacture, is now ready for immediate showing, according to an announcement by C. Leonard Shaw, publicity manager. It is a 30-minute, 16 mm. film showing step-by-

WOOD TANKS

Built to Specifications

66 YEARS OF TANK BUILDING SERVICE

Plating and pickling tanks built to your specifications is a Kalamazoo specialty — any size or shape — fir, oak, cypress or redwood.

Tanks on left were made for large manufacturer of automobiles. They are 88" x 64" x 62" — made of 8" long-leaf yellow pine with B & M anti-acid metal tie rods.

Write today for estimates and suggestions.

Kalamazoo TANK AND SILO COMPANY

828 HARRISON ST. • KALAMAZOO, MICH.

step manufacturing processes from mining bauxite in Arkansas to the finished product in Worcester: Alundum (aluminum oxide) and Crystolon (silicon carbide) grinding wheels.

The film also touches on other Norton products such as grinding machines, refractories, pulpstones, sandpaper, sharpening stones, porous mediums, non-slip floors and tile, and wear-resistant products.

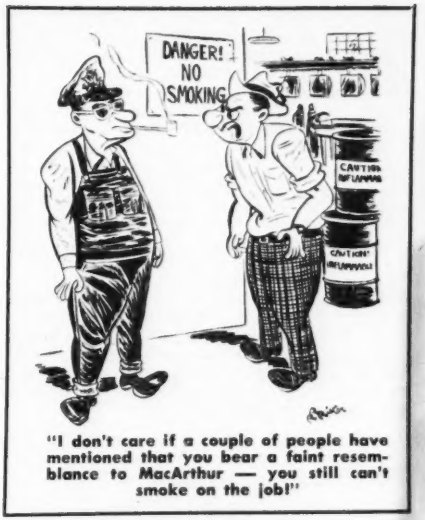
This new film is now available, free of charge, on loan by writing to "Grits That Grind," Norton Company, Worcester 6, Massachusetts.

Demineralizers. The Industrial Filter & Pump Manufacturing Co., 5904 Ogden Ave., Chicago 50, Ill., has issued a four-page catalog giving detailed information with principal specifications and performance data on its standard demineralizer units for chemically pure water. Besides a general description of the construction, installation, and operation of Industrial demineralizers, the catalog explains the principle of demineralizers, gives suggestions for their use, and applications for various manufacturing and chemical processes, such as electroplating and so on.

Murray-Way Nos. 51 and 52 Multi-Position Polishing and Buffing Heads. Comparative drawings explain the unusual flexibility of positioning available with the Murray-Way adjustable fulcrum heads. It is stated that the full swing of 360 deg. on both axes simultaneously allows automatic positioning of the head and thereby ensures full contact on irregular pieces.

The bulletin is available from the Murray-Way Corp., Box 180, Birmingham, Michigan.

3M Barrel Finishing. Faster production and better finishes produced by barrel finishing of fabricated metal parts are described in a booklet available from Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul, Minn. The illustrated 12-page, two-color booklet tells what barrel finishing is, who can use it, and what specific advantages it offers. It gives new applications for "Honite" and "Super Honite" abrasive chips, "Honite" compounds developed specifically for barrel finishing, and 3M barrel finishing equipment. Illustrated in the booklet are deburring, surface-finishing, and precision-finishing of a wide variety of metal parts.



"I don't care if a couple of people have mentioned that you bear a faint resemblance to MacArthur — you still can't smoke on the job!"

Polyethylene Plastic Containers. American Agile Corp., Plastics Div., 5806 Hough Ave., Cleveland 3, Ohio, has prepared an eight-page illustrated bulletin describing fabricated, completely rigid bottles, jars, and safety jugs for storage and transportation of corrosive chemicals. Capacity, weight, and chemical resistance of the containers are listed.

Norris Gyromat, a new concept in industrial coating, is the subject of an illustrated folder released by The Gyromat Corp., P. O. Box 600, Fairfield, Conn. In this method, paint is held against the inner surface of a horizontal revolving drum by centrifugal force. Design features break up some of the paint into a mist which floats upon the ware and thus paints it. Parts to be painted ride through the revolving barrel on a conveyor.

Design features which eliminate overspray losses, as well as a list of the versatile uses for the machine, are included in the folder.

"Grinding and Polishing Magic" is the title of a six-page pocket-size folder which illustrates and describes Chicago Rubber Contact Wheels, Available from the Chicago Rubber Co., 2620 N. Clybourn Ave., Chicago 14, Ill., the folder shows various applications for the different type wheels. The R50, R51, and R52 rubber contact wheels, used with abrasive belts for polishing many products, are described, and advantages to be gained through their use are outlined.

Blade Applicator for Wedge Shaped Films. Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Md., has prepared a leaflet describing the Applicator for Wedge Films, especially useful in the study of wrinkling as a function of paint film thickness.

Running-Time Recorder. A bulletin describing the Series 500 Running-Time Recorders, prepared by The Bristol Co., Waterbury 20, Conn., provides information concerning the application of the instrument to factory machinery, pumps and motors, conveyors, continuous ovens, and furnaces. Liberally illustrated with photos of models, reproductions of chart records, and operation drawings, brief descriptions of other Bristol Production Recorders are given in **Bulletin OP1504.**

"How to Obtain a Grade 1 (or Equivalent) Finish on Steel," a technical folder prepared by the American Chemical Paint Co., Ambler, Pa., describes "Granodine," which is used to phosphate coat steel to obtain a finish meeting Grade I of Government Specification JAN-C-490 and equivalent requirements of other specifications.

Data on means of application, operational sequence, heat and chemicals requirements, and coating time are included in this folder.

Ferrotite Metal Conditioner. History, purpose, application, and uses of this metal conditioning primer are presented in **Technical Bulletin PF-3004,** available from the Baltimore Paint & Color Works, Baltimore, Md. Based on new resins, the primer is applicable to ferrous metals, aluminum, and magnesium alloys.

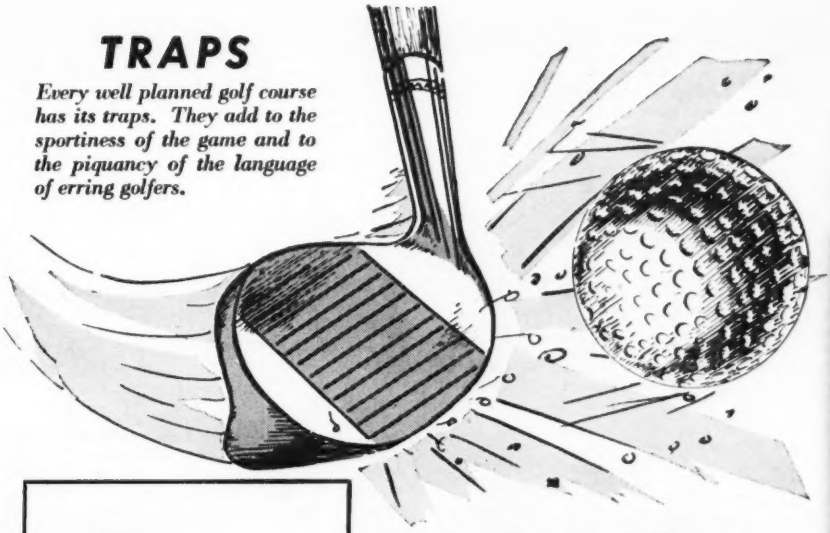
It is claimed that Ferrotite eliminates conventional chemical metal surface preparations and it air dries for recoating in a few minutes. It can be applied by various methods such as spraying, dipping, brushing, and roller coating.

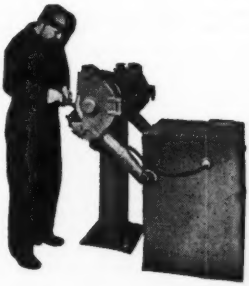
Bench Belt Grinders. Both single and double belt bench grinders are shown, together with specifications and advantages, in a four-page two-color catalog published by the Porter-Cable Machine Co., 1708 N. Salina St., Syracuse 8, N. Y.

ODDS ARE
2 TO 1
Improved
DETROIT
HANDY "TAC" RAG
NON INFLAMMABLE
You'll get a cleaner surface with the improved DETROIT HANDY "TAC" RAG. Standard of your FINISHING INDUSTRY for 17 years. Removes all particles of dust, lint and sand. Non-inflammable! Order from your supplier today, or send for sample.
DETROIT HANDY "TAC" RAG
DETRO MFG. & SALES CO., INC., CULVER CITY, CALIF.

TRAPS

Every well planned golf course has its traps. They add to the sportiness of the game and to the piquancy of the language of erring golfers.





TORIT DUST COLLECTORS

Torit manufactures both self-contained cabinet type and cyclone type dust collectors. They range in size from ½ to 5 H. P. There are models for every standard service and special adaptations can be quickly created.

Torit Dust Collectors

are the traps that will make sport of the dust problem in your plant

Your employees will be shooting par when dust-creating machines are equipped with Torit Dust Collectors. There'll be no abrasive dusts to make them hook or slice . . . no extra hazards to finished parts or costly equipment.

Fixing up your plant is as easy as dropping a six inch putt, for Torit Dust Collectors are economical . . . in cost, in operation and to maintain. They also fit into present or future production layouts.

Ask one of the pros . . . the 20,000 users of Torit Dust Collectors . . . how you can cut strokes off your game, or write for details and latest Torit catalog.

TORIT

Manufacturing Co.

314 Walnut Street St. Paul 2, Minn.

Black Oxide Process. The Mitchell-Bradford Chemical Co., 2446-D Main St., Stratford, Conn., has available descriptive bulletin, **No. MB-3**, and operating instructions on Black Magic Type A, a salt used in the blackening of steel and iron by the black oxide process. All the steps from finding the tank capacity to final finishes are included in the operating instructions in this bulletin.

Baker Film Applicator. A simple film applicator with adjustable clearance, dependable accuracy, and ease of manipulation, the Baker Film Applicator is fully discussed and illustrated in a six-page folder available from Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Maryland.

White Enamel. The Kay & Ess Co., Kiser and Leo Sts., Dayton 4, Ohio, has available **Laboratory Data Sheet No. 2** which fully discusses Straight and Modified 101-E Type White Enamel. Performance data on such tests as flexibility, 20 hours in 5 per cent caustic soda, 2 hours in boiling water, 20 hours in 3 per cent hydrochloric acid, as well as other tests, are tabulated for these two enamels. Also included is a list of U. S. Government Specifications for which Kay & Ess formulas have been completed.

Lithorizing with "Lithoform", an improved method of preparing galvanized and zinc-coated surfaces for paint, is the subject of a four-page folder available from the American Chemical Paint Co., Ambler, Pennsylvania. Uses and means of applying the zinc phosphate coating chemical are included in this folder.

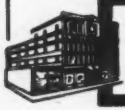
"How Increasing Your Steam Costs Can Save Money," an eight-page manual, consists of 16 questions and 16 answers written in easy-to-read, shirt sleeve English. For executives in the industrial and heating fields, it offers genuinely helpful information regarding the efficient use of steam. **Booklet No. 2171** can be obtained from Sarco Co., Inc., Empire State Bldg., New York 1, New York.

Spiral Woven Wire Conveyor Belts and Complete Conveyor Systems. Korb-Pettit Wire Fabrics and Iron Works, Inc., 1505-15 N. Mascher St., Philadelphia 22, Pa., has prepared **Catalog No. 31** which contains 40 pages of illustrated standard and special types of wire belting weaves with specifications and detailed descriptions. Power formulas, construction and design details are covered fully, as well as suggestions for prolonging belt life and increasing efficiency. Also included in this handbook are engineering data on wire gauges and conversion tables.

IS YOUR PROBLEM
POLISHING?

HOLLAND SUGGESTS:

Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing and various other applications.



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276 SOUTH NINTH ST. • BROOKLYN, N.Y.

McKeon's
"Liquid Sulphur"
(1) FOR STRIPPING COPPER
Safe, no current required, no etching.
(2) FOR OXIDIZING COPPER
(3) FOR OXIDIZING SILVER
Sulphur Products Co., Inc.
GREENSBURG 8, PA.

you save 50% in TANK HEATING and COOLING with PLATECOIL

(REPLACE PIPE COILS)

★ You SAVE 50% in tank SPACE
★ You SAVE up to 50% in initial COST
★ You have 50% LESS WEIGHT to handle
★ You SAVE 50% in maintenance LABOR as plates are changed from outside the tank without dumping solution

. . . besides all these you get faster heating or cooling. Take advantage of the engineering assistance offered by Kold-Hold to help you with your heat transfer problems.

Send for complete technical manual and descriptive Bulletin No. P50.

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

Why Platecoils Cost Less

LOW FIRST COST

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

EASY INSTALLATION

By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

GREATER TANK CAPACITY

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

WEIGHS 50% LESS

Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

TANK MAINTENANCE WITHOUT LOSS OF SOLUTION

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

LITERATURE

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

HIGH BTU TRANSFER

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

For more complete information on products and processes use READER SERVICE CARDS inside covers.

Micro-Polish Units. Leaflets illustrating the Micro-Polish Unit and multiple unit installations for sheet polishing can be obtained from the Murray-Way Corp., Box 180, Birmingham, Mich. Essentially designed for a wet process the equipment may also be used in a dry process where desirable. The unit includes a micrometer adjustment, automatic belt oscillation and control, and a self-aligning billy roll which is adjustable for work pressure.

Other pertinent data and a functional arrangement of the basic unit are given in the leaflets.

NEW BOOKS

Galvanizing (Hot-Dip). Third edition. By Heinz Bablik. Published by John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 502 pages. Illustrated. Price, $10.00.

Dr. Bablik, owner-manager of a galvanizing plant, and lecturer at the Technical University of Vienna, presents an exhaustive survey of hot-dip galvanizing. He discusses the structure and composition of the scale that occurs as a result of surface oxidation and covers the pickling theory and practice for scale removal. After describing the nature and use of fluxes, Dr. Bablik devotes the major portion of his book to galvanizing theory and practice.

Completely revised and re-illustrated, the new edition includes the latest methods and processes. The author has extended his discussions of iron-zinc reaction and included illustrations showing the structure of the scale and zinc layers.

Corrosion — Causes and Prevention. Third edition. By Dr. Frank Newman Speller. Published by the McGraw-Hill Book Co., 327 W. 41st St., New York 18, N. Y. 650 pages. Illustrated. Price $10.00.

Written with particular reference to the ferrous metals, this book discusses the theory of corrosion and describes the various methods for preventing it. Highlights of the new edition are its coverage of cathodic protection, an important new factor, and inclusion of the latest information on biological influences and newly-developed corrosion preventives.

The first part of this reference volume describes the known facts about corrosion and the generally accepted electrochemical theory of corrosion. The controlling factors that contribute to the various kinds of corrosion are described in simple language, free of mathematical and thermodynamical terms. The author then classifies these types of corrosion according to the controlling factors which act external to the metal: temperature, rate of motion, films and coatings, concentrations of dissolved substances, acids, alkalies, oxiding compounds, and the like. He also describes the principles and methods found desirable for laboratory and service testing for corrosion.

Part two consists of eight chapters devoted to a detailed coverage of corrosion —prevention in the atmosphere, underwater, in closed water systems, in steam generators, in steam and hot-water heating systems, in the chemical industries, and underground. Pertinent data on the calculation of corrosion rates, conversion tables, additional tests for determining corrosive activity, alloy analysis, and a glossary are given in the Appendix.

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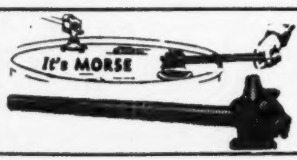

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One Coat Paint Project: Eighth Quarterly Report. 222 pages. Illustrated. Available from the U. S. Department of Commerce, 1015 Chestnut St., Philadelphia 7, Pa. Price $8.00 in microfilm; $28.75 in photostat. (Orders should be accompanied by remittance payable to the Librarian of Congress.)

A report covering two years of research on the Signal Corps' "One Coat Paint Project" is now available to the public, the office of Technical Services of the U. S. Department of Commerce has announced. The report, prepared by the New York University College of Engineering for the Army's Squier Signal Laboratory, is divided into eight major parts: basic research on the process of drying; drying paint films with light energy; the electrographic method for testing paint permeability; panel paint tests; improvements in the development and evaluation of coatings; improvements in laboratory equipment; studies on adhesion; and a bibliography of the chemical reactions in the formation and drying of coating materials.

Developments of interest include new findings on the solid phase of oils; drying tests conducted under ultra-violet light; new advances in electrographic testing methods to improve their adaptability to a wider range of problems; studies in the use of catalysts to produce heavier paint coatings; and further experiments in the use of the new Epon resin coatings.

Symposia on Varnish and Paint Chemistry. Published by New York University College of Engineering. For copies send remittances in advance to V. W. Palen, Bureau of Public Information, NYU College of Engineering, New York 53, N. Y. 1948 Symposium, $2.00; 1949 Symposium, $4.00. Reprinted papers delivered at subject symposia.

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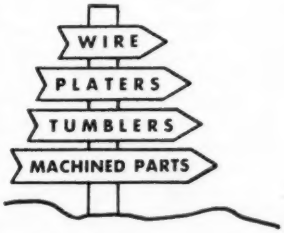

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Klem-Kote Three-Step Cleaning and Conditioning Process is discussed in an illustrated brochure available from Klem Chemicals, Inc., 14401 Lanson Ave., Dearborn, Mich. Applicable to steel, iron, and aluminum, the three-stage washing process is particularly advantageous to mass production setups.

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INDEX TO ADVERTISEMENTS

Abbott Ball Co. 95
Acme Mfg. Co. 71
Allied Research Products, Inc. 21
Almco Div., Queen Stove Works, Inc. 82
Alvey-Ferguson Co. 33
American Chemical Paint Co. 53

Bacon Felt Co. 80
Baker & Co., Inc. 77
Baughn Chemical Products Co. 104
Better Finishes & Coatings, Inc. 54
Blakeslee & Co., G. S. 6
Brookfield Engr. Labs., Inc. 78

Cambridge Wire Cloth Co. 69
Carborundum Co. 7
Chicago Rubber Co. 107
Churchill Co., Inc., Geo. R. 84
Columbia Electric Mfg. Co. 40
Cowles Chemical Co. 10

Darco Dept., Atlas Powder Co. 89
Davis-K-Products Co. 124
Detrex Corp. ..... Fourth Cover
Detro Mfg. & Sales Co., Inc. 120
DeVilbiss Co. 8, 9
Du Pont de Nemours & Co., E. I., Electrochemicals Dept. 73

Egyptian Lacquer Mfg. Co. 4
Enthone, Inc. 75

Fostoria Pressed Steel Corp. 24, 25

Haas-Miller Corp. 125
Hanson-Van Winkle-Munning Co. 3
Harding Mfg. Co. 74
Harrison & Co., Inc. 117
Harshaw Chemical Co. 85
Hercules Powder Co. 63
Holland & Sons, Inc., J. 122

Industrial Filter & Pump Mfg. Co. 102
Interchemical Corp., Finishes Div. ..... Third Cover
International Nickel Co., Inc. 37

Kalamazoo Tank & Silo Co. 118
Kellogg Div., American Brake Shoe Co. 42, 43
Keystone Emery Mills 106
Kirk & Blum Mfg. Co. 64, 65

Klem Chemicals, Inc. 97
Koch Sons, Inc., George 105
Kold-Hold Mfg. Co. 123

Lanly Co. 76
Lasalco, Inc. 55
Lowe Bros. Co. 48, 49

Mahon Co., R. C. 46, 47
Manufacturers Processing Co. 114
Mitchell-Bradford Chemical Co. 87
Morse Mfg. Co., Inc. 124
Murray-Way Corp. 79

National Air Sander, Inc. 91
National Paint, Varnish & Lacquer Assoc., Inc. 44, 45
Nopco Chemical Co., Inc. 41
Norton Co. 2

Oakite Products, Inc. 1
Ohio Blow Pipe Co. 57
Osborn Mfg. Co. 59

Parker Rust Proof Co. 81
Peters-Dalton, Inc. ..... Second Cover
Phillips Mfg. Co. 61
Pittsburgh Plate Glass Co., Brush Div. 51
Pittsburgh Plate Glass Co., Paint Div. 34, 35
Platers Research Corp. 120
Potter Paint Co., Inc. 20

Randolph Products Co. 112
Roberts Rouge Co. 86
Rockford Varnish Co. 93

Sherwin-Williams Co. 67
Siefen Co., J. J. 31
Stevens, Inc., Frederic B. 23
Strand, N. A., Div. of Balmar Corp. 83
Striplastic Co. 22
Sulphur Products Co. 122

Thierica Studio 92
Titeflex, Inc. 52
Torit Mfg. Co. 121

Udylite Corp. 19

Varnish Products Co. 116

Wiegand Co., Edwin L. 39

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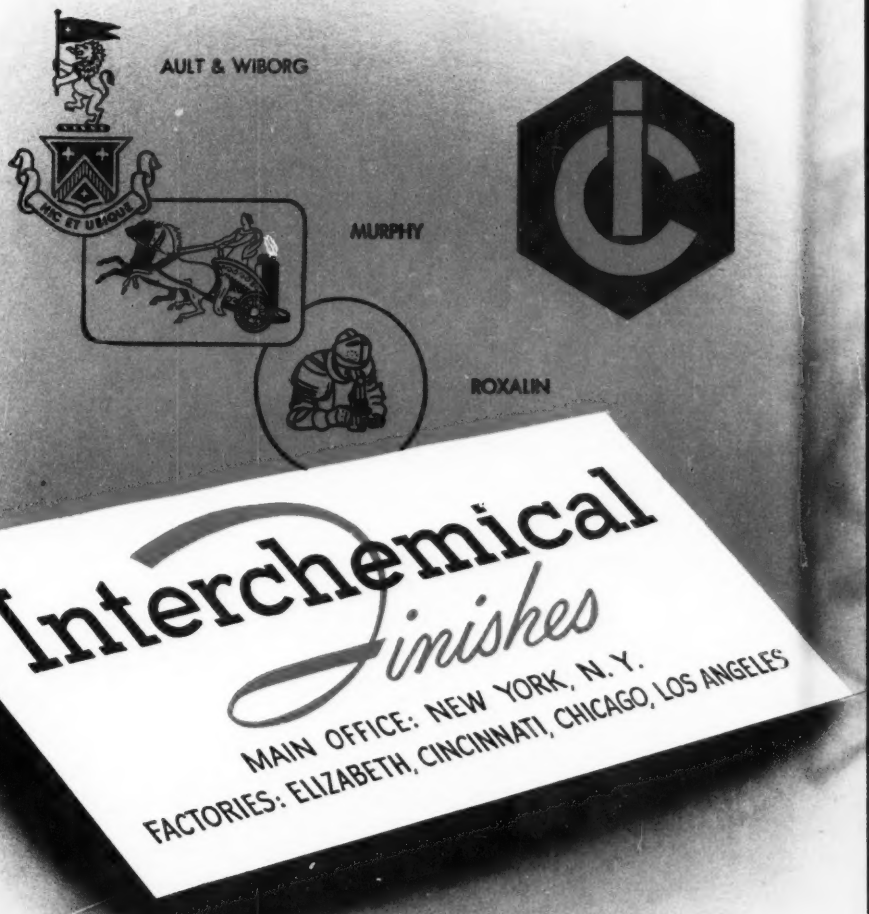

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